

NETWORK WORLD

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► USERS UNITE

T-1 users knock lackluster service

Carriers score low in several categories.

BY JOHN DIX
Senior Editor

Members of the first independent T-1 users group are frustrated with chronic service outages and lackluster carrier support, according to a recently compiled survey of their ranks.

The 15 to 20 companies that participated in the group's initial meeting at the International Communications Association conference in Atlanta this June gave T-1 carriers a less-than-stellar C+ rating and highlighted a number of areas where they say service providers must improve.

The initial gathering of corporate T-1 customers was held to gauge the need for a users group and to air concerns about current T-1 services, according to group founder and leader Al Weresow, manager

of corporate telecommunications with Sterling Drug, Inc., based in New York.

Enthusiasm generated by the roughly 30 user representatives and subsequent word-of-mouth contacts has proved encouraging, and Weresow said he hopes to organize a second formal meeting by the end of the year.

The T-1 group will provide a forum for users to exchange experiences and information while giving them a collective voice and a pipeline to carriers. Weresow also said he hopes the group will be able to provide input on new service development.

According to recently released documents from the initial meeting, T-1 users are most concerned with performance issues and the manner in which service problems are handled.

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FEATURE FOCUS

Brought back from the brink *Vsats save the day for satellite system vendors.*

BY BOB WALLACE
Senior Writer

Reports of the death of satellite data services are greatly exaggerated.

Satellite technology, once branded expensive and inefficient in comparison with terrestrial methods, has made the communications technology comeback of

the year.

The rebirth of satellite technology can be largely attributed to the creation of very small aperture terminals, commonly referred to as small satellite earth stations. Vsats are typically less than eight feet in diameter and are far less expensive than large satellite dishes, especially

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NETWORK LINE

News

Uncle Sam doesn't feel up to unweaving the tangled TCP/IP conformance testing web, so the U.S. Defense Communications Agency officially

washes its hands of the chore. Page 2.

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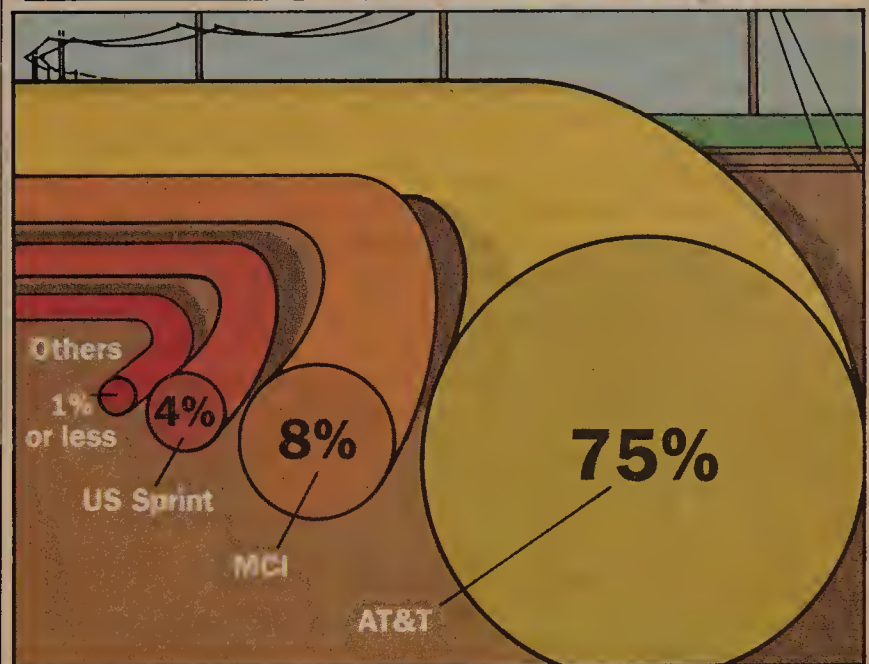
Sytek is helping the New York Hospital graft two separate networks into a new single hospitalwide data and video local network. Page 5.

US Sprint Communications Co. nets a prize user catch in Sears, Roebuck & Co. The long-distance carrier will provide Sears with a variety of long-distance voice and data services. Page 6.

Features

Corporations are choosing among a variety of alternatives in order to make the break to bypass independence. Page 33.

The dust settles in the equal access battle



► LONG-DISTANCE ELECTION

AT&T landslide at equal access polls

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — After two years and tens of millions of marketing dollars, the equal access battle has ended with most users choosing to continue business as usual.

As equal access balloting ends today, it is clear that AT&T, despite its initial fears to the contrary, remains the undisputed king of the long-distance hill. About 75% of users who cast ballots decided not to leave the AT&T fold. MCI Communications Corp. and US Sprint Communications Co., the only two competitors to win market shares

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► SOFTWARE-DEFINED NETWORKS

SDN lures big user *Transamerica dumps EPSCS.*

BY BOB WALLACE
Senior Writer

LOS ANGELES — Faced with dismantling its nationwide voice communications network, Transamerica Information Services opted instead to become an early user of AT&T's Software-Defined Network (SDN) service and expects to save \$1 million per year in the process.

The company, a wholly owned subsidiary of Transamerica Corp., provides voice communications services for roughly 10,000 Transamerica employees at 100 locations. Each Transamerica company is autonomous and is not required to purchase voice communications services from Transamerica Information Services.

Skyrocketing costs of connecting individual company locations to AT&T's Enhanced Private Switched Communications Service (EPSCS) forced Transamerica Information Services to ditch the service or risk losing its Transamerica subscribers. Several disgruntled EPSCS users are considering jumping the EPSCS ship because of the exorbi-

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► NETWORK BUILDING BLOCKS

Standards groups push ISDN specs to market

Move to stifle vendor-specific efforts.

BY JOHN DIX
Senior Editor

Standards-making bodies have mounted an effort to publish key Integrated Services Digital Network interim standards by year end in the hope of thwarting the rise of vendor-specific de facto standards.

The Consultative Committee on International Telephony and Teleggraphy specifications, which will be published in the so-called Gray Book, are being rushed to publication to give vendors some standards to build to while waiting for the next official ISDN specification release in 1988, insiders told *Network World* last week. ISDN recommendations are published every four years.

Although the CCITT does not often accelerate its standards procedures, according to Joan LaBanca, district manager of data and ISDN standards at Bell Communications Research, "the signaling layers have been changed a lot since the 1984 Red Book and are not expected to change again before 1988." LaBanca is a member of the T1D1

group, a subcommittee of the American National Standards Committee's T1 Telecommunications Committee, which studies ISDN and makes recommendations to the CCITT.

The standards recommendations that are being accelerated include the following:

■ The I430 basic user network interface, also known as 2B+D, which details the physical and electrical specifications for an interface that supports two 64K bit/sec digital channels and a 16K bit/sec signaling channel.

■ The I440 and I441 second, or data link, layer signaling specifications above I430, which are also known as Q920 and Q921.

■ The I33X, a new specification that was not in the 1984 recommendation and has yet to be assigned a final number designation. I33X is a numbering plan standard that would enable ISDN networks to be connected with networks that have different numbering plans, allowing, for example, a terminal on one net to be addressed by a host computer on another.

The CCITT indicated last year

that it also intended to accelerate I451, the third network layer above I440 and I441, but, according to LaBanca, it does not appear that will happen now. Unlike the other standards efforts, "work has progressed on Layer 3, but not to the point where there is a stable text which can be reviewed." A stable working text is required before any standard recommendation can be accelerated, LaBanca said.

Pressure to accelerate the standard has come from domestic and international carriers and equipment manufacturers, analysts said. "Upcoming market trials have produced a lot of market pressure in the U.S. to develop ISDN products," said Mary Johnston, a senior telecommunications consultant with BBN Communications Corp., a consulting firm in Cambridge, Mass.

"If you don't have standards, one of two things happen," Johnston said. "No products get built, or vendors build almost-ISDN products that conform to what they think the standards are going to be or what they would like the standards to be." Legitimate standards are hard to sanctify once vendors invest in their own interpretations of the standards.

Although the Gray Book is still being compiled, most vendors have a good idea of what it will contain because of ongoing standards coverage, according to LaBanca. Once fully published, the interim standards will have the same clout as the 1988 standards, she said. □

► ANALYSIS

Uncle Sam cashiers TCP/IP

Conformance tests too tough a job.

BY PAUL KORZENIOWSKI
Senior Editor

MONTEREY, Calif. — Corporation for Open Systems (COS) supporters beware. Ensuring that devices on a multivendor network really can work together has proven to be a task too complex even for Uncle Sam.

Last week at the first Transmission Control Protocol/Internet Protocol (TCP/IP) Vendor Workshop ("TCP/IP future at stake," *Network World*, Aug. 25), the U.S. Defense Communications Agency (DCA) announced it is washing its hands of TCP/IP conformance testing.

The agency oversees transmission facilities that link government agencies, universities and corporations into one giant network of networks. The umbrella network grew out of the Advanced Research Projects Agency Network (Arpanet), See **TCP/IP** page 3

► BANKING

Freddie Mac offers net

Midanet builds on networking expertise.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — Is the Federal Home Loan Mortgage Corp., better known as Freddie Mac, in the network business?

Well, sort of. The quasi-governmental corporation is doing what commercial banks have long recognized is a means of generating more business. Freddie Mac is capitalizing on its internal networking expertise and extending it to customers.

Freddie Mac has developed Midanet, a network that allows the Washington, D.C.-based corpora-

tion to communicate instantly with its customers, savings and loan institutions and mortgage bankers. The basis of Midanet is a micro-to-mainframe communications package called Network Navigator, developed by American International Communications Corp. of Boulder, Colo.

Net increases core business

Freddie Mac is not really interested in selling network services. Rather, it sees the network as a means of increasing its core business. Freddie Mac is in the secondary mortgage business. It pur-

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► LABOR

IBEW talking strike

A strike against New England Telephone by the 20,000 members of the International Brotherhood of Electrical Workers (IBEW) appears to be brewing, *Network World* learned late last week.

IBEW workers have until Friday to vote on a proposed contract agreement reached in early August.

The vote so far at four of 10 lo-

cals within New England Telephone's region is 10 to one against the agreement, said Ed Thomas, IBEW Rhode Island local president and business agent. If IBEW members vote against the contract, IBEW will strike beginning Saturday, he said. At issue are overtime, temporary transfers and the use of contracting labor. □

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The vendors of two error-checking protocols, MNP and X.PC, face off over their strengths and weaknesses. **Page 27.**

► **FEDERAL COMPUTER CONFERENCE**

Fibercom to debut deals, product

Inks accords with Martin Marietta and Sun Microsystems.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — FiberCom, Inc. is expected to make a series of product and marketing announcements at the Federal Computer Conference here this week. The Roanoke, Va.-based fiber-optic network firm will announce contracts with Martin Marietta Corp. and Sun Microsystems, Inc. and unveil a new virtual machine environment (VME) plug-in interface board.

FiberCom has signed a contract with Martin Marietta to integrate FiberCom's WhisperNet fiber-optic network into an intelligence system

that Martin Marietta is designing for a joint Army and Air Force tactical communications system. The fiber Ethernet local network will

System/Enemy Situation Correlation Element, will enable tactical commanders to receive and process intelligence data from a variety of

“Commanders will receive near real-time intelligence for strategic decisions.”

connect VAX-type devices to process intelligence data in the field.

The Martin Marietta system, dubbed the All-Source Analysis

sources and sensors using sophisticated computers mounted in shelters and on tactical vehicles. Using file searches, message processing

and graphic situation displays, commanders will receive near real-time intelligence for strategic decisions.

“Martin Marietta implemented the network in fiber optics because data security, speed and light weight are critical in this type of application,” said Albert Bender, president of FiberCom.

Sun Microsystems will use WhisperLAN/VME in its Sun 3 Tempest workstations. The new VME card, which is the foundation for the WhisperLAN/VME network, contains a fiber-optic Ethernet transceiver and RS-232-C fiber-optic modem card.

The VME capability allows Sun workstations to be networked using fiber-optic links.

Workstations that traditionally support Ethernet are now able to take advantage of fiber-optic technology in engineering and advanced computing environments, Bender said.◻

► **ANALOG UPGRADE**

Mitel to unveil all-digital version of SX-200 PBX

Soon-to-debut model measures up to rivals AT&T System 25, Rolm Redwood.

BY BOB WALLACE
Senior Writer

KANATA, Ontario — Mitel Corp. is expected soon to introduce an all-digital version of its SX-200 analog private branch exchange, a move the firm hopes will strengthen its position in the low-end PBX market.

The SX-200 Digital PBX will support up to 250 telephones and 156 trunks. The most widely used version of the current analog unit has a total of 144 switch ports. It can be upgraded to handle either 240 or 336 ports.

The 144-port version is non-blocking for 100 simultaneous voice links or 19.2K bit/sec asynchronous data links.

Rick Miskiman, product market-

ing manager for Mitel, would not estimate the per-line cost of the SX-200 Digital PBX.

Miskiman said the unit will support modem pooling but will not accommodate the company's new Superset 3DN and Superset 4DN digital voice/data telephone sets until the spring of 1987.

The announcement of the SX-200 Digital PBX will come roughly two months after AT&T's System 25 was introduced (“AT&T Systems 25 targets Redwood,” *Network World*, July 7.)

The introductions of the System 25 and Rolm Corp.'s Redwood served to heighten competition in the low-end PBX market. A recent market study performed by the Framingham, Mass.-based International Data Corp. (IDC) claimed

AT&T edged out Mitel in total lines shipped for low-end (under 200-line) PBXs in 1985.

The report revealed that AT&T captured 35% of this market, while Mitel accounted for 32%. NEC America, Inc. placed third with a 25% market share.

If a substantial number of Mitel's large installed base of analog SX-200 and SX-100 users upgrade their PBXs to handle the maximum 480 ports, Mitel may be able to wrest market share from AT&T, Northern Telecom, Inc. and Rolm in the mid-range (200 to 799 lines) PBX market. The IDC study indicated AT&T captured 29% of this market last year. Northern Telecom ended up with 25%, Rolm with 19% and Mitel with 7%, according to the study.

A baseline SX-200 Digital PBX, configured to handle 144 lines, appears to measure up well against both the System 25 and Redwood. Both the Mitel SX-200 and the AT&T Systems 25 either offer, or are expected to offer, circuit-switched data capabilities, while Redwood does not. The Mitel SX-200 Digital PBX will support 156 trunks while the System 25 can handle 104 and the Redwood, 48.◻

► **TELEVIDEO SYSTEMS**

Multinet server in the works

BY MARGIE SEMILOF
Senior Writer

SUNNYVALE, Calif. — Televideo Systems, Inc. is developing a network server designed to work with a variety of popular local-area networks, including Ethernet, IBM's Token-Ring Network, Proteon, Inc.'s Pronet, Datapoint Corp.'s Arcnet and AT&T's Starlan.

While company officials refused to disclose details about the product or its likely debut date, sources say the server uses a version of Novell Corp.'s Advanced Netware software to manage network routing and is based on Televideo's IBM Personal Computer AT-compatible, Tele-286. The server is said to use Intel Corp.'s 80286 processor.

The server will reportedly provide a means for IBM Personal Computer ATs and compatibles to accommodate up to four different local-area network adapter cards. Data file transfer between the different networks would be possible because each network would use the same implementation of Advanced Netware software.

Roland Day, Televideo product manager, said that, other than the multinetwork support feature, the product would be similar to Novell's S-Net, a star topology network that supports up to 24 users.

The Novell product uses a Motorola Corp. MC 68000 processor and a 140M-byte hard disk. The company recently announced the server would accept an Arcnet interface card, so users can support an Arcnet topology.

Analysts said they believe Televideo has embarked on the server project in an effort to increase sales of the Tele-286.◻

TCP/IP from page 2

designed in the late 1960s as the world's first packet-switching net.

The original network has expanded so that today it supports more than 30,000 computer systems ranging in size from Cray Research, Inc.'s supercomputers to Apple Computer, Inc.'s Macintoshes.

For the last few years, DCA and a number of other government agencies have been developing test suites and creating a center for TCP/IP conformance. The work was similar to that undertaken by COS, which will handle Open Systems Interconnect (OSI) conformance testing and the development of test suites. At the workshop, two government officials told attendees that plans for the center had been dropped.

The DCA has developed and continues to design conformance test criteria, but they are not robust enough to ensure that all TCP/IP products can interoperate. “There have been instances where vendors have spent a lot of time and money trying to ensure their products would perform on the government network,” said Daniel Lynch, president of Advanced Computing Environments in Cupertino, Calif. “When their product was linked to another company's product, they couldn't communicate.”

Government officials declined to discuss the decision. But conference attendees speculated the government found the task of supplying comprehensive conformance tests nearly an impossible one.

One problem testers faced is that the only way to test a product prop-

erly is to attach it to the target network, a procedure that the DCA would not condone. Also, running a testing center requires a great deal of money and engineering talent. Lynch said only a handful of engineers are qualified to develop and run conformance tests.

The DCA decision leaves TCP/IP vendors with a number of unappealing options. They could form a COS-like organization. But the consensus seemed to be that fewer rather than more of such standards organizations are needed.

Individual companies could develop their own testing procedures. But the resources required for such self-testing could limit the number of vendors able to bring TCP/IP products to market. Attendees formed a task force to explore how vendors should proceed.◻

► NETWORKING

Behemoth single-vendor net erected

In under a year, Gemcraft crafts a network based almost solely on System 75s, T-1 links and Information Systems Networks.

BY MARGIE SEMILOF
Senior Writer

HOUSTON — A Texas-sized boom in the housing industry made an instant superuser out of Gemcraft Homes, Inc. In less than a year, the company has constructed a network from scratch that already boasts six AT&T System 75 private branch exchanges and four T-1 circuits. The company is also installing 10 AT&T Information Systems Networks (ISN) linking its major locations.

The communications team at the \$300-million home-building, mortgage and real estate company built the network — which consists almost solely of AT&T products — during a time when many experts claimed that no one vendor could meet all a user's networking needs.

Gemcraft offices, located throughout Texas, Tennessee, Oklahoma and Georgia, are connected via leased AT&T T-1 circuits for voice and data and 56K bit/sec and 9.6K bit/sec lines for data.

The lines feed into one or several of Gemcraft's six System 75 PBXs. There are two System 75s in Houston, one of which is used for both voice and data and the other for voice only. Offices in Dallas, Fort Worth, Texas, San Antonio, Texas, and Atlanta each have one PBX. Other Gemcraft offices use AT&T Merlin key phone systems.

Each System 75 boasts AT&T's Electronic Tandem Network (ETN) capability for automatic route selection and alternate routing for on- or off-network communica-

tions. Locations using Merlin phone systems can use the ETN capability by connecting through tie lines, which are private lines that link PBXs, or through direct inward dialing.

"Our old key systems were a mess," recalled Julie Walsh, Gemcraft voice systems supervisor. "The vendor had to come in every time we moved a phone or added an end user to a pickup group, and we were adding employees all the time. Using System 75, I can make station changes from my desk."

The 10 ISN networks will eventually connect to each major Gemcraft facility and to every PBX. Systems Director Don James said that by using an ISN, he can download information from host computers — two Hewlett-Packard Co. HP3000 Model 70 superminicomputers and one HP Model 1000 minicomputer, all located in Houston — to a variety of HP, AT&T and other personal computers. James is also able to hook a terminal to any of the three host computers on the network without expensive and complicated hardware reconfiguration.

"Without ISN, if users want to access several computers, we would have to give them more than one terminal or a switch box," James said.

Tom Ducharme, systems manager for Mortgage Banque, a Gemcraft division, said the new network transmits data about twice as fast and is far more reliable than the previously used Tymnet network.

"Every afternoon at four

o'clock," he said, "Tymnet would overload and the system would go down. The network would also go down when we tried to send our nightly reports."

"Our users faced about five to six days of downtime each month. All of our loans close at the end of the month. If we have downtime during that time, we are dead. Using the new network, we are down only about 2% or 3% of the time."

James is responsible for doling out the department's \$2.1 million annual budget, a job he says is difficult because of continually increasing line charges. He claims most increases are for local loop services and not private-line or long-distance services. James is examining the possibility of using a customer-provided access method between buildings. "I could save \$4,000 a month in local loop costs by running microwave between my Dallas and Fort Worth locations," he said.

And although the company is virtually locked into AT&T products, James is not concerned about paying AT&T prices.

"We are not always looking at direct dollar savings," James said. "Increased end-user productivity and maintaining network uptime is more important. We have to provide something that helps employees get their jobs done. When you have people on computers eight-plus hours a day, they get frustrated using something that runs 1,200 bit/sec."

James and Walsh chose AT&T to
See **Gemcraft** page 7

► BELLSOUTH CORP.

Carrier gets FCC nod for special-access hikes

BY MICHAEL FAHEY
Staff Writer

WASHINGTON, D.C. — Despite opposition from both users and long-distance carriers, BellSouth Corp. last week joined the growing ranks of local exchange carriers that have won Federal Communications Commission approval for increased special-access charges on private-line service.

BellSouth received FCC permission to raise the price of the local channel portion of private line service in Georgia and Florida beginning today.

The Florida increase raises private-line bills by 32% and will cost users about \$5 million through the end of the year. The Georgia increase will raise private-line fees by 11%, and it will cost users \$2 million before Jan. 1, 1987, according to an FCC spokesman.

The local channel is the part of a private line that connects a long-haul carrier's point of presence within a Bell operating company's territory to a customer's premises.

In response to BellSouth's increase, AT&T last week sought nearly \$20 million in private-line price increases. AT&T said it is passing on to users the cost of the BellSouth special-access rate hikes.

In its filing, BellSouth said the increase was necessary because it had initially underestimated the cost of providing private-line service and also because demand for private-line service has been less than anticipated.

The FCC recently approved similar increases requested by New York Telephone Co. and New England Telephone, both Nynex Corp. companies, and by Bell Atlantic. The revised Bell Atlantic tariff, which will cost private-line users

\$14 million this year alone, took effect on Aug. 16.

AT&T has proposed some \$13 million in price increases in response to Bell Atlantic's actions. The Nynex rate became effective Aug. 6 and is expected to cost users \$40 million in 1986.

The FCC temporarily delayed implementation of the tariff hikes for New York Telephone, New England Telephone and Bell Atlantic in the face of opposition from users and long-distance carriers ("FCC puts a halt to increase in access fees," *Network World*, Aug. 4).

The Ad Hoc Telecommunications Users Committee, which represents some of the largest users in the nation, opposed the increase by New England Telephone and New York Telephone because the carriers failed to provide adequate information justifying the increases.

Bell Atlantic's increase was challenged by US Sprint Communications Co. and by AT&T. The long-distance companies also maintained that Bell Atlantic did not adequately document its claim that demand for special access has decreased, while the cost of providing the service has increased. □

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"ABC" membership applied for"



ABP

► NETWORKING

New York Hospital merging two nets into a single data and video LAN

With the help of Sytek, graft will produce a hospitalwide link.

BY NADINE WANDZILAK

Staff Writer

NEW YORK — A 1,000-bed hospital here is grafting two limited networks into one new hospitalwide, data and video local network with 25 miles of coaxial cable linking 83 departments and 50 nursing units.

In addition, The New York Hospital is looking to replace its "very expensive" 6,000-phone Centrex system with a voice and data private branch exchange that could ultimately be tied into the network.

The local network, which is being built by Sytek, Inc., connects a Stratus computer in the hospital laboratory to asynchronous dumb terminals at each nursing unit. Most of the laboratory-access terminals are already tied into the network, and nurses and doctors are extremely pleased with them, according to Barry Kriesberg, executive assistant in the hospital's General Services Division. Each nursing unit will also be equipped with an IBM 3278 terminal starting in October.

In addition, personal computer users within the hospital can ac-

cess information transmitted over the network. The hospital also plans to link a three-year-old image transmission network in the radiology department to the local net to provide hospitalwide access to diagnostic images.

"Hospitals have not been in the forefront of this kind of technology," Kriesberg said of the overall network. "We think we're pretty advanced on this, and we're pleased with ourselves."

Three factors led the hospital to its decision to install the local net, Kriesberg said. One was cost. Wiring all of the hospital's terminals on a point-to-point basis into its five host computers alone would have cost more than \$600,000, he said. The hospital has spent about \$500,000 to date on the net and expects to spend more.

A second factor was the hospital's desire to expand the existing local-area network within its radiology department. That network connects the department's Magnetic Resonance Imaging (MRI) machine with viewing terminals within the department. MRI uses magnetic fields and a computer to produce diagnostic images. The ra-

diology network was established as a pilot program when the department installed the MRI.

Digitized images such as MRI scans will be more widely accessible on the new hospital network in a year or two, Kriesberg said. Image transmissions would require special terminals. But three terminals at a nursing unit — one for the radiology image transmission network, one asynchronous terminal linked to the lab and the IBM 3278s — would make too large a footprint, a problem the hospital is hoping to avoid. "We're looking for a streamlined hardware approach," he explained.

The third reason the hospital decided to combine its networks was to take advantage of broadband coaxial wiring installed in one building, but never activated, in the early '80s. The wiring was installed in anticipation of the hospital's future needs.

Sytek is providing several network components, including its System 6000, a second-generation version of the IBM PC Network, which Sytek manufactures. The vendor is also providing its asynchronous terminal-to-host System

2000 network to provide all RS-232-type connections across the network. Its System 3000, which allows asynchronous terminals to communicate with IBM 3270 controllers, is being used to link the System 2000 to the IBM world.

This month Sytek will deliver bridges "between the personal computer and the RS-232 world without having to use the RS-232 port on the personal computers," according to Adolf Genaro Jr., Sytek branch sales manager working with the hospital on the project. Sytek is also writing a special interface for light pens on the IBM terminals that are scheduled to be brought up at the end of October. Some 500 IBM display terminals and 140 printers will be connected across the network, Genaro said.

Up to 120 subchannels can transmit simultaneously at 128K bit/sec over the new hospital net. The transmission speed between ports on the Sytek PC network is 2M bit/sec, according to Genaro.

Wiring for the hospitalwide local-area network started April 2. The three-wire installation, with two wires supporting one-way video and the third supporting data, was completed in July. The hospital selected Sytek over IBM, AT&T, Ungermann-Bass, Inc., Proteon, Inc. and Applitek Corp. as its local net supplier.

The hospital now has an eight-port tap every 50 feet, creating what Kriesberg referred to as "a tremendous connection-intensive plant." □

Equal from page 1

worthy of mention, were chosen by only about 10% and 4% of users, respectively.

Despite the huge difference between AT&T's market share and that of its competitors, MCI and Sprint claimed victory, saying they doubled their market shares.

Equal access was a requirement imposed on the Bell operating companies by the U.S. District Court under the terms of the Modified Final Judgment. The court ordered the BOCs to change their equipment to provide all long-distance carriers with the same quality connection to BOC transmission and switching facilities as that given AT&T.

Prior to converting their central offices, the BOCs were required to send ballots to customers asking them to choose a long-distance carrier.

The purpose of equal access was to foster competition, to do away with AT&T's monopoly in the long-distance market, to put its competitors on a more equal footing and to give customers a choice of vendors and service.

But AT&T did what many thought was impossible. It proved it could mobilize its resources and compete against smaller, more agile rivals such as MCI and US Sprint.

According to Fritz Ringling, telecommunications analyst with Gartner Group, Inc., "Businesses have greater choice now, but what we have is not really competition. AT&T still sets the pace of the in-

dustry and the others follow.

"We had everything to lose and nothing to gain," said David Carey, director of consumer markets at AT&T.

"Early on, analysts predicted doom and gloom for AT&T. Competitors thought they would have an easy task of taking business away from us. But we refused to lay down and play dead," he said.

Three overriding factors contributed to AT&T's success, Ringling said. "The first was inertia by the public," he stated.

"The second was that quality is of utmost importance, especially with business users. And AT&T launched a very effective marketing effort."

The competition did not have an easy task competing with AT&T's vast resources. US Sprint "thought equal access was wonderful at first," US Sprint spokesman Sid Courson said. "We soon found out it wasn't so wonderful, and we had to totally change the way we did business to compete with AT&T's massive marketing blitz."

Equal access created a great deal of user confusion and complication, especially at large corporations that had to assess calling patterns in hundreds of offices in order to choose a long-distance carrier. The process of analyzing the carriers and seeing the whole process through to implementation often placed a great burden on telecommunications departments.

Despite the toll on communications managers, equal access gave

► RETIX

Starlan controllers out

Targeted at low-end, local net market.

BY NADINE WANDZILAK

Staff Writer

SANTA MONICA, Calif. — Retix last week introduced two AT&T Starlan controllers targeted at the low-end, local-area network market.

The announcement comes on the heels of the Institute of Electrical and Electronics Engineers' approval of a lower speed version of the 802.3 networking standard. The 1M bit/sec version of 802.3 describes a Starlan-like local net.

Retix announced the PC-9 controller board for the IBM Personal Computer. Based on Intel Corp.'s 82588 chip, the PC-9 provides the physical interface between Starlan and the Personal Computer. The controller board can run any personal computer communications software protocol, including the

Transmission Control Protocol/Internet Protocol, X.25, XNS and Retix' Open Systems Interconnect (OSI) protocol software.

The company's PC-11 product combines the PC-9 controller board and Retix's OSI protocol software and IBM Network Basic I/O System interface.

Retix, based here, sells primarily to OEMs, but a spokesman said the company will market the controllers directly to large end users. The PC-9 and PC-11 are available for shipment. The target end user price for the PC-11 is about \$200, and for the PC-9 card itself it is less than \$200, said Charles Fogg, vice-president of marketing and sales.

Retix sells a line of Starlan hubs and Starlan controllers as well as software for OSI/Manufacturing Automation Protocol/Technical and Office Protocol. □

users a very tangible way of telling the industry what they wanted, said George Dellinger, an industry analyst with the Washington Analysis Corp.

"Equal access asked customers to take an accounting of their telephone needs," he said. "It gave them the ability to choose based on

service, equipment and cost."

Equal access had a more direct impact on small businesses and residential users than it did on large corporations. Large corporations are not as dependent on equal access-type service because, in many instances, they have their own private networks. □

► BYPASS

Bank showcases its net

In four years, National Westminster's "network under glass" saves \$10 million.

BY MARGIE SEMILOF
Senior Writer

MELVILLE, N.Y. — The network control center at National Westminster Bank U.S. is showcased behind glass walls, an honor befitting the nerve center of a network that has reduced communications costs 50% and saved the bank nearly \$10 million since 1982.

Housing the control center under glass was actually an afterthought. The glass walls are designed to heighten visibility of the communications function and create an attractive work environment for employees. But the deployment of National Westminster's network was carefully planned to reduce voice and data communications costs that were spiraling upward at an astounding 30% yearly.

Rather than swallow the notion of paying increasingly large communications bills, Jeffrey Speight, vice-president and director of communications, convinced senior management to install a multi-million dollar network aimed at bypassing the phone company.

The data processing center here is the hub site for the \$10 billion bank's voice and data communication network. Speight connected three of the bank's five other main offices to the DP center using redundant microwave systems. The other two locations are connected to the center using microwave facilities with redundant fiber-optic links.

The bank's 140 branch locations are linked through telephone lines or tie lines to the five main offices scattered throughout the New York metropolitan area.

Within the five offices, 14 Northern Telecom, Inc. private branch exchanges handle voice and data traffic with the branches. Among the PBXs are two 6,000-line SL1 XN switches, several 400-line SL1 MS switches and several 128-line SL1 S PBXs.

Speight predicted the bypass network would slash the bank's communications costs using even his most conservative estimates. "We laid out the cost of building and maintaining our own system," Speight said, "and we figured the network would pay for itself in three years."

In fact, after four years, the new network has saved National Westminster Bank \$9.9 million by reducing its communications cost roughly 50%. During the same period, the bank has expanded its network by 30%.

Speight, former data communications manager for the bank, accepted voice communications responsibilities in 1981 when the institution merged the two departments.

"The opportunities for data communications were fantastic," he re-

called, "but the voice side was a little foreign to me. After working with both technologies for a while, the similarities between the communications functions became more apparent."

Speight credits an experienced staff with assisting in a smooth merging of voice and data within the bank. "Also, digital PBXs were a relatively mature technology, so we weren't up against anything too new," he said.

There are currently few local networks in use, but Speight is evaluating the possibility of purchasing more. He is interested in choosing one vendor for local net services, just as he chose one PBX vendor in an attempt to standardize the bank's network operations.

Speight said the savings derived by switching from utility-provided services to PBXs were enormous and that they subsidized the rest of the department's equipment acquisition needs. "Our whole budget is either flat or decreasing," Speight said.

By presenting the project as a major cost-saving device, Speight said he had no problem passing his strategic plans through senior management.

However, he recognized that he was essentially building his own phone company and would have to attract a quality staff to run the network. Speight hired five technical engineers and approximately 15 voice and data analysts. The bank still relies on vendors for equipment maintenance.

"The dollars we saved on the network more than offset the cost of building and maintaining our own staff," he said.

Speight's network has been a source of pride to the bank since its inception. When systems were completed in both Melville and the New York headquarters, both network control sites and PBX sites at those locations were housed in glass rooms and equipment encased in custom-designed furniture. Speight said the bank wanted to create an environment that reflected the bank's multimillion dollar network investment and would be pleasing to communications employees.

"They are in stressful positions," he said, "and usually don't get thanked for a job well done. The only time the communications staff hears from anyone is when something is broken."

The glass enclosures have attracted the curiosity of both bank employees and individuals that tour the bank's facility. Speight takes further advantage of his showcase network by offering a presentation explaining the importance of the communications function. "The network's heightened visibility helps to increase our end user's communications literacy," he said. ▢

► INDUSTRY INSIGHT

US Sprint, Sears sign long-distance contract

BY PAM POWERS
Senior Editor

ATLANTA — US Sprint Communications Co. last week signed on a major new user, inking a multiyear contract with Sears Roebuck and Co. for a multitude of voice and data services.

Under the terms of the contract, the value of which was not disclosed, Sears will employ the entire range of Sprint's services, including long-distance, Wats and T-1 channels.

A Sears spokesman said, "US Sprint services are being added to Sears' voice and data nets as we speak." Sears now operates separate voice and data networks from

several long-distance companies, including AT&T. Sears will combine voice and data traffic over the T-1 channels. An unspecified portion of communications services will be transferred to Sprint from Sears' current carriers, but "Sears will continue to buy some services from other carriers," the spokesman said.

Sears estimates that by year end, the voice network will support 140 locations served from 12 regional centers. The data network will support 30 regional centers serving some 80,000 terminals.

Sprint services will be used throughout the U.S. and will be available to all Sears companies for purchase on an ongoing basis. ▢

SDN from page 1

tant cost of acquiring EPSCS network access lines from local telephone companies.

AT&T's SDN service enables users to route calls to any number of locations linked to the net through over 100 network access points in AT&T Communications, Inc.'s national, public-switched telephone network. EPSCS, AT&T's flagship voice communications service, enables users to route calls in a similar fashion but only through less than two dozen network access points.

In mid-May, AT&T cut over 50 of those locations from EPSCS to SDN without incident. George Lombardo, senior vice-president of communications and chief operating officer for Transamerica Information Services, said 50 additional locations have since been hooked to SDN. Lombardo claimed a non-SDN location can be added to the network in five days. The SDN network may grow to embrace another 40 to 50 sites in 1987, he said.

"In a five-month period, beginning in January and ending with our cutover, the cost of sending a call over the EPSCS network rose 27%," Lombardo explained. "We were starting to lose customers before we left EPSCS."

Transamerica Information Services had connected roughly 100 facilities to various EPSCS network access points using access lines acquired from numerous local telephone companies. "With EPSCS, we accessed network entry points in New York City, Chicago, Los Angeles and Dallas," Lombardo said. "Any location we had to add to the network cost us a fortune."

Because SDN can be accessed through a greater number of network entry points, Transamerica has not needed to acquire SDN access lines longer than three miles, he said.

The use of SDN as the company's voice communications net has brought much favorable feedback from the systems users, Lombardo said. "Very seldom do you receive

compliments in this business," he said. "Our users tell us they are extremely pleased with the quality of their communications services. Users could not believe the initial cut-over went as smoothly as it did."

Fifteen percent of the calls are placed between locations on the network; 85% are off-network calls, Lombardo said.

AT&T's staff arranged to connect the first 50 EPSCS locations to the nearest SDN network access point. The system cutover, which Lombardo said was accomplished overnight, required AT&T to break the 50 EPSCS line connections while activating the 50 SDN access lines. Although this task required little effort at the user locations, adding the next 50 user locations to SDN required these users to acquire SDN network access lines.

Some stumbling blocks still remain with SDN. Lombardo is waiting for AT&T to provide his company with much-needed call detail information.

"In the first few months, AT&T was having problems getting us the call detail information we needed," he said. "If we can't get the data from AT&T, we can't accurately bill SDN users." Lombardo said the situation seem to be improving, and he expects it to be cleared up in another month or two.

Transamerica Information Services is also anxiously awaiting SDN service enhancements that would enable it to spot network traffic congestion points and network access line failures. "In 1974, when we were using AT&T CCSA network service, we had a system management console we used to determine which access lines were operating improperly," Lombardo said. "Now we don't know whether or not our users are having problems with their network access lines."

Such equipment would also enable the company to study network traffic to determine which, if any, network access lines were unnecessary, he said. ▢

► INTEROPERABILITY

Equipment woes limit military communication

U.S. House investigates compatibility shortcomings in gear of armed forces.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — When the combined U.S. Armed Forces invaded the island nation of Grenada in 1983, they accidentally fired upon each other because their communications systems were incompatible.

Navy planes mistakenly bombed 82nd Airborne forces, killing one soldier and injuring 17 others.

In Vietnam, the Air Force often could not provide air support to Army ground forces because their radios were incompatible. The Air Force used UHF/AM radios and the Army, VHF/FM. As recently as 1985, during joint training exercises, troops were unable to communicate.

Such interoperability problems with the military's radio, satellite and terrestrial communications systems were the focus of a recent U.S. House of Representatives legislation and a National Security

Subcommittee oversight hearing.

The House investigation was spurred by an Institute for Defense Analysis study that concluded a major problem is "a lack of adequately defined, joint user needs

“Testifying before the subcommittee, Davis said, ‘The services historically have been unable to communicate effectively among themselves during joint operations and exercises.’”

and requirements.” The institute is an independent research group.

According to the study, "Secure radio and data distribution systems encompass such diverse requirements and procedures among the armed services that duplication

and lack of interoperability are inevitable unless some central control authority can oversee the developments taking place in the individual services."

During the 1983 invasion of Grenada, the services were unable to communicate with each other in a secure manner, "because each service arrived in Grenada with a variety of different radios, satellite communications links and encryption devices, all of which were incompatible," said Richard Davis of the National Security and International Affairs division of the General Accounting Office (GAO).

The GAO was asked by Con-

gressman Jack Brooks (D-Texas), chairman of the subcommittee, to review the interoperability situation. The subcommittee hearing was designed to collect information on the subject. The results will be released early next year and recommendations will be made to the Secretary of Defense.

Testifying before the subcommittee, Davis said, "The services historically have been unable to communicate effectively among themselves during joint operations and exercises. This was the case in Korea, the Dominican Republic landing, Vietnam and almost 20 years later in Grenada."

In 1984, the Department of Defense established the Joint Tactical Command, Control and Communications Agency (JTC3A) to promote interoperability. Its mission is to develop a Defense Department-wide interoperability architecture, specifications and testing programs that will create common voice and data communications systems that can communicate effectively.

The GAO reports that such an architecture is still many years away. One of the problems is that JTC3A is only an advisory panel that makes recommendations to the Joint Chiefs of Staff and the Secretary of Defense.

In a 1983 GAO report on joint system acquisitions, the GAO found "no organization or management level has the final word or the sustained clout to gain acceptance and implementation of its decisions. Although the secretary of defense and joint chiefs have the authority to make such choices, they have not exercised it to any great degree." □

Freddie from page 2

chases mortgages from savings and loan institutions and mortgage bankers. It then pools these loans and issues mortgage-backed securities to Wall Street investors.

"We have a business need to expand the conduits to our customer base, a means for customers to originate loans with us and account for the principal and interest on those loans on a daily, weekly or monthly basis," said Otto Doll, director of telecommunications services at Freddie Mac.

Limited Midanet access offered

Doll is scheduled to speak about Midanet at the Federal Computer Conference to be held here this week. Freddie Mac has begun offering access to Midanet on a limited basis and hopes to move to general availability later in the month. There are currently 70 users on the network. Freddie Mac has not charged these initial users for network software but is developing a pricing scheme. As a sign of its commitment to the project, Freddie Mac will no longer accept paper forms, with the exception of legal documents, after October 1987. All forms will be exchanged electronically.

Originally, all transactions between Freddie Mac and its customers were carried out on paper and sent through the mail. In a first step toward automation, customers sent information to Freddie Mac on magnetic tape. Then customers installed remote job entry links from their mainframes to Freddie Mac's.

The rise of personal computers offered new possibilities. "With

computing power on the customers' desks we can exchange information rapidly and begin to offer many more services," Doll said. "But with the personal computer, we had to decide how we were going to communicate."

A year ago, Freddie Mac went shopping for a micro-to-mainframe link. The options included terminal emulation packages that would have allowed personal computers to access a host as dumb terminals. But such links really didn't provide the functionality Freddie Mac needed.

Proprietary links tied to specific application packages did not fit the bill either. Freddie Mac uses custom-designed software and didn't want to be tied into a particular vendor's application. "We were looking for a better communications link," Doll said. "That's when we came across Network Navigator."

Doll said he believes Network Navigator represents a new approach to micro-to-mainframe links. In addition to its communications functions, the product provides application development tools, security systems and audit capabilities, according to Barbara Goldworm, director of marketing at American International Communications and a principal developer of Network Navigator. The package costs \$80,000 for the initial host installation, including 25 personal computer copies of the software.

"Because our customers are so far-flung, we had to make use of a value-added network," Doll said. "I needed a communications package

that would allow us to transmit from a personal computer to our mainframe through an intermediate holding point, the value-added network, which is a store-and-forward network. The customer can transmit data even when our host is down, and the value-added network will hold the data until our host is ready to accept it." Midanet uses the General Electric Information Services Co. network to transmit data.

Interface can be customized

According to Doll, the mainframe-based package allowed Freddie Mac to establish an integrated network. The communications environment is defined using a proprietary host compiler. All communications definitions are handled by the host compiler, he said. The user interface can be customized to an organization's particular needs.

"Network Navigator allows us to have user transparency," Doll said. "What our customer sees are our applications. They have no idea what is happening from a communications perspective except that data is coming to or from Freddie Mac."

Network Navigator can use both dial-up and direct connections, enhanced asynchronous and synchronous communications. Text and binary data can be distributed to any user or device on the network, with security similar to that of a private mail system. Network Navigator offers several options, including IBM 3270 terminal emulation, dial-up access and personal computer-to-personal computer communications. □

Gemcraft from page 4

supply all of the company's voice and data products simply because they said they believed a single vendor system would help the small communications staff get control of its expanding network. A diverse, multivendor system would be confusing and difficult to manage, Walsh said.

In addition, each company location uses the same communications tools, which Walsh says makes it easier to train employees. The communications staff also saves time by having one point of contact for data for telecommunications maintenance and service.

"We solicited bids from other vendors in 1985," James said. "We decided we were better off in terms of project control if we stuck with one vendor." James ordered the networking tools in July 1985. The network was up and running by March 1986.

The size of Gemcraft's account also commands same-day maintenance and service calls from AT&T. The company has experienced very little network downtime. Most of the problems that have arisen stemmed from T-1 outages due to the burnout of local loop repeaters.

However, total reliance on one vendor does have drawbacks. James purchased AT&T multiplexers knowing they lacked networking features.

Those features, he was told, would come in the form of upgrades that were set for release last April. He estimates that the lack of these promised upgrades is costing his company approximately \$18,000 per month. □

T-1 from page 1

Among the most nagging problems, users agreed, are short but chronic service outages, a condition they believe stems from error bursts. Weresow said some users have experienced the bursts several times a day. The errors result in a bothersome clapping sound for voice communications, while data users have experienced severe retransmission problems and complete data losses.

Too often, the carriers respond to such service complaints with a "no trouble found" statement, customers in the group agreed. They concluded that short outage problems should be logged into carrier repair records as an "information ticket only," a designation that

would enable carriers to track service performance instead of relying on a single spot check.

Service support was a bone of contention for most of the users in the group. "T-1 trouble reports are treated like any other problem calls," Weresow complained. "A single digital circuit that has been out for an hour is treated as being more severe than a T-1 outage reported five minutes ago, even though the T-1 is equivalent to 24 circuits."

Once T-1 links go down, service restoration is too slow. According to notes from the meeting, users felt T-1 facility problems should be given research as well as repair priority. The participants said carriers should establish T-1 trouble hot

lines and provide a single point of contact to report problems.

Although marketing representatives from T-1 carriers understand the magnitude of service problems, they do not have much clout with the service organizations that actually fix the facilities, Weresow said.

Part of the problem with service outages is that they happen more frequently than users expect. Carriers cloak terms concerning service availability in the usual statistics about service uptime, percentage figures that appear as standard and acceptable but are deceiving given the bulk nature of the service. An outage ratio that may be tolerable for a single line is often less tolerable for a T-1 facility that provides the equivalent of 24 circuits.

Even though downtime is a serious user concern, group participants and other users that contacted Weresow were less concerned about availability than other items outlined in the Weresow survey.

The users were asked to rate their T-1 carriers on a scale of one to five, with one being poor and five being excellent. The group ratings were: performance, 3; stability, 3; availability, 3.9; service, 3.1; and support, 3.3.

Independence from vendors

Weresow said he wanted to start the users group because AT&T had not been able to generate enough user interest in forming a T-1 users group of its own. After Weresow had arranged the formation of the group, AT&T formed and held its own meeting. That users group, however, is only for very high-volume AT&T T-1 users, Weresow said.

Participants of Weresow's group said in the survey they thought users group members should not be subject to a minimum service expenditure and that it was important to maintain independence from vendors, particularly because it would enable users of any T-1 carrier to join the group. □



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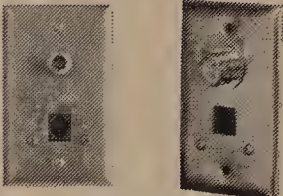
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Letters:

Church direct lines

This letter is in response to the concluding article in the four-part series on integrity ("In search of a freebie," *Network World*, Aug. 18). There was no lead-in to notify the readers that the subject of the series was changing to freebies from Rbotches — the writer's acronym for regional Bell operating telephone company hassles. Your editing made the church look like it was asking for a freebie from Illinois Bell Telephone to do a "busy signal analysis."

The church can't do the analysis, only Illinois Bell can. We were asking for Illinois Bell to do the analysis to determine if the church needed to expand its incoming line capacity from two lines to three or four lines because the church's AT&T equipment was coming off lease and a decision had to be made from an equipment expansion standpoint. If the church expanded its line capacity, Illinois Bell would be the financial beneficiary. Line analysis is a service the company is supposed to provide — not the church looking for a freebie.

Second, I was told by an Illinois Bell representative that a busy signal analysis had been completed on the church's lines and that the church needed to expand to three or four lines. Of course, this expansion would have put a lot of extra money into Illinois Bell's coffers.

When I called to get the actual figures for the busy signal study so that the church's financial committee could analyze the figures, I was told that the

analysis had not actually been completed.

Third, Illinois Bell started the test on a Monday. The church's phone lines did not "need" to be down for the day; Illinois Bell's test technicians crashed the phone system all day. I called Illinois Bell to get a credit for the day's bill. After much haggling, they finally relented and gave the church credit for the day.

Finally, I received a call about a week or two later from Illinois Bell saying that it couldn't complete the analysis because it "couldn't figure out how to do it on the church's phone lines." If Illinois Bell can't, who can? I would certainly like to read an Illinois Bell rebuttal.

Robert W. Wester
Foresight
Westmont, Ill.

Letters may be edited for space and clarity.

Correction:

In the column by Alan Pearce entitled "Modifying the Final Judgment" (*Network World*, Aug. 18), an editorial error implied that the Massachusetts Institute of Technology is promulgating telecommunications policy. Pearce points out that although MIT professor Peter W. Huber is indeed preparing an important report on the Modified Final Judgment, he is on leave from MIT and is preparing the report at the request of the U.S. Justice Department. Huber's four aides are not associated with MIT. □



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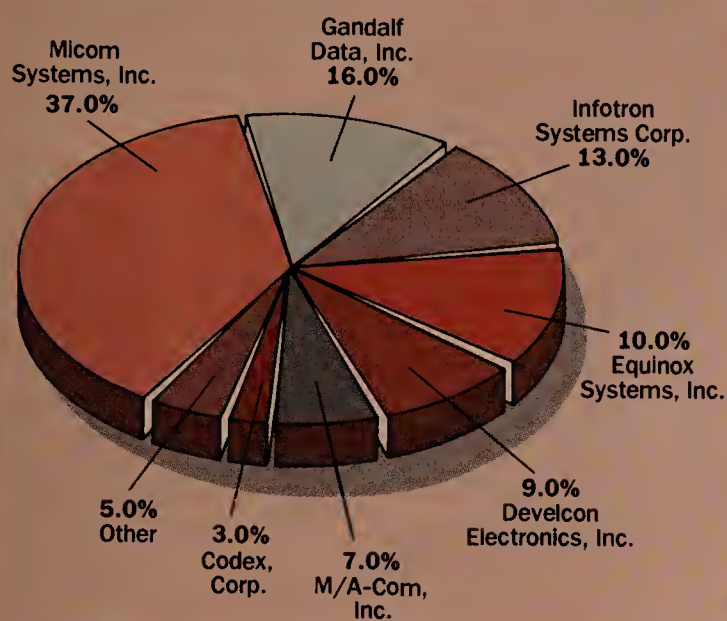
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and address.

INDUSTRY UPDATE

Yellow Pages come on line

The Instant Yellow Pages Service is now on line. Need to know how many dentists there are in Parsippany, N.J.? Or the names, addresses, and phone numbers of all the gift shops in Walla Walla, Wis.? For a subscription fee of \$95, and charges of \$1.00 per minute of connect time, the information is yours, courtesy of American Business Lists, Inc. of Omaha, Neb.

U.S. data switch market: vendor share by revenue



1985 U.S. Total = \$73,395,000

SOURCE: INTERNATIONAL DATA CORP. FRAMINGHAM, MASS.

► REORGANIZATION

Concord Data divides to conquer

Concord Communications spins off to handle MAP products, take strain off modem group.

BY BOB WALLACE
Senior Writer

MARLBOROUGH, Mass. — Concord Data Systems, Inc. last week spun off as a separate company its local-area network products division, a move industry analysts said was aimed at lessening the financial strain on the company's modem operations.

The newly formed Concord Communications, Inc. has received \$9.5 million in venture capital funding from 10 investor companies. The fledgling company will focus

its attentions on developing and marketing factory networking products that are compatible with the Manufacturing Automation Protocol.

Concord Data Systems' data communications division, which develops and markets 2,400 bit/sec and 9.6K bit/sec full-duplex, dial-up modems, will continue operations as Concord Data Systems.

Ken Miller, Concord Data Systems' founder, will serve as chairman of the board of Concord Communications. The company's board of directors includes Jack

See **Concord** page 10

► STREAMLINING

Gould slims down to high tech

Defense businesses to go on the block.

BY PAM POWERS
Senior Editor

ROLLING MEADOWS, Ill. — Gould, Inc. last week said it will divest itself of its defense systems divisions in an effort to better focus its high-technology market efforts. The divestiture, in conjunction with the sale of other company divisions, is expected to generate more than \$550 million in revenue.

In announcing the divestiture, James F. McDonald, Gould's president and chief executive officer, said the sale of Gould's medical divisions, real estate operations and what remains of its battery operations brought to market in 1984 will strengthen the company's balance sheet and assist in the continued growth of its commercial electronics businesses.

Of Gould's \$1.42 billion 1985 revenue, the defense systems divisions contributed about \$400 million, or 28% of the total. The divisions manufacture and market equipment for antisubmarine war

See **Gould** page 10

VENDOR VIEW

F. MORGAN LAMARCHE

Network control tools: Who will watch the watchers?

Networks are terrific when they work right. The problem is keeping them working right. When they don't work as intended, a business loses services it needs to sell its products. In cases where the network has practically become the product, like an automated cash dispenser, a network with operating problems can mean no product at all.

Vendors in the network management industry deal with customers who run some of the biggest networks in the world. What those customers have in common is that in today's world, you can't be an insurance company or an aerospace company — or almost any other kind of company — without a network. And if that network isn't managed efficiently and effectively, you're going to be left behind as a business.

Ten or so years ago, networking was fairly easy. A wire went from a user's terminal

to a host computer. Simple. But not for long.

First, the user moved; so a local cable could no longer serve as the connection. That problem was solved by networking with

*“If your
network isn't
managed
efficiently
and
effectively,
you're going
to be left
behind.”*

modems via telephone lines. But that solution threw analog signals and more equipment into the picture. Things began to get more complex.

Soon there were more network components — front-end processors, cluster controllers, multiplexers, matrix switches, channel switches. Some devices were smart; a computer could monitor and interrogate them to find out what was wrong in their piece of the network.

But a whole new dimension developed. Instead of the user connected to a slot, it was another computer or a remote front-end processor. Then came trunk networks and T-1 multiplexers with two or eight or 20 remote hosts, packet networks, dial-up networks, local-area networks and integrated voice and data private branch exchanges.

Users took a good look at these very complex networks and asked, “How in the world can anybody manage that?” There are intelligent devices spread all over the network, gathering large amounts of information about their own operation. They all report to a computer, and their reports come out on a terminal. But what they give the operator is practically unusable raw data. Buried some-

See **Control** page 10

Concord from page 9
Blaeser, a former group executive vice-president with Gould, Inc.'s Industrial Automation division; Andy McLane, partner, TE Associates; Gerry Bay, partner, Vista Ventures; Rick Frisbie, partner, Battery Ventures; and Tony Helies, who also serves as Concord Com-

lease financial information.)
Frischia maintained that the separation of the two divisions will take much financial pressure off the modem company. "There has been so much competition in the modem marketplace that the modem division could no longer be milked for revenue to support the local-area network group," he explained.

Concord Data Systems faces stiff competition in both the 2,400 bit/sec and 9.6K bit/sec modem markets. International Data Corp., (IDC) a Framingham, Mass.-based market research and consulting firm, estimated sales of 2,400 bit/sec full-duplex modems reached \$118.7 million in 1985.

The report predicted sales of 2,400 bit/sec modems will reach \$207 million by year end and will increase to \$416 million by 1990. The study said Concord Data Systems, which captured 13.4% of this market, finished second to Hayes Microcomputer Products, Inc., which garnered a 26.1% share of the market. Racal-Vadic, Inc. (12.4% 1985 market share) and Microcom, Inc. (10% market share) will be battling to overtake Concord Data Systems' by year end, the IDC study predicted.

Concord Data Systems, Codex Corp., AT&T, NEC America, Inc. and British Telecom International are all currently battling for the No. 1 spot in the nascent 9.6K bit/sec modem arena. Concord Data Systems is planning to begin shipments of its 9.6K bit/sec units this fall.

Concord Communications is banking on user acceptance of MAP. MAP is designed to allow equipment produced by a variety of vendors to communicate over a single, token-passing bus-type network. Although numerous large users have announced support of the factory communications specification, only a handful are currently installing MAP-compatible local-

area networks in their manufacturing facilities.

General Motors Corp. and Ford Motor Co. will both have production MAP networks operational by year end. IBM, AT&T, Procter & Gamble, McDonnell Douglas Co. and Weyerhaeuser Corp. have chosen to create MAP pilot networks before attempting to implement MAP-compatible networking equipment in their plants.

Networking equipment originally marketed by Concord Data Systems is compatible with several of MAP's seven layers and is currently in use at four GM plants. Other users implementing Concord Data Systems' MAP-compatible network components include IBM, Deere & Co., Kaiser Aluminum and Chemical Corp. and Haworth, Inc.

Concord Data Systems had bolstered its stance in the MAP marketplace by inking OEM agreements with prominent networking vendors such as Digital Equipment Corp., Honeywell, Inc., Data General Corp., Fairchild Data Corp. and Siemens Communications Systems, Inc. Mike Zak, marketing vice-president for Concord Communications,

Gould from page 9
fare, avionics and command control communications and intelligence. The divisions' revenue grew from nearly \$348 million in 1983 to approximately \$395 million in 1984.

A spokesman, Gerard Corbett, said Gould is currently involved in discussions with several companies that have expressed interest in purchasing the defense systems divisions. Gould declined to identify the potential buyers.

Since 1984, Gould has moved to shed various divisions of the company, commencing with its battery operations in that year. Corbett said, "Gould, in the last six years, has gone from being diverse in many different markets to becoming strictly high tech."

With the latest divestiture, the company will now focus on information systems, industrial automation systems, test and measurement equipment and electronic components and materials. McDonald said he anticipates a 15% growth rate for these businesses, starting from current revenues of some \$1 billion.

Gould's corporate headquarters will remain here. Following the divestiture, the company expects to employ a total of approximately 12,500 people worldwide. The company currently employs some 17,500. Corbett said, "In the past, Gould has had to adjust the work force to reflect changes in the industry." However, he would not comment further on possible layoffs resulting from the divestiture.

Operations and principal locations involved in the divestiture plan are: Advanced Systems Development, Glen Burnie, Md.; Ocean Systems, Cleveland and Glen Burnie, Md.; Navcom Systems, El Monte, Calif.; Systems Protection, Philadelphia; Systems and Simulation, Melville, N.Y., and Tampa, Fla.; Microwave Products, San Jose, Calif.; and related research and development activities here.

"The modem side of the company has always been Concord Data's cash cow, Friscia explained."

"The new firm will have to fend for itself."

munications' president.
Anthony Friscia, a managing partner with Chicago-based Advanced Manufacturing Research and a former MAP communications product manager for Concord Data Systems, said the spin-off of Concord Communications will allow Concord Data Systems to improve its stance in both the 2,400 bit/sec and 9.6K bit/sec modem markets. "The modem side of the company has always been Concord Data's cash cow," Friscia explained. "The company was using revenue from modem sales to support the local-area network division."
Concord Communications will now have to fend for itself in the factory networking jungle. "The modem division will no longer be able to bail them out financially," Friscia explained. (Privately held Concord Data Systems does not re-

said agreements such as the alliance with DEC have helped develop awareness of the various networking offerings that Concord Communications is able to make.
"The DEC agreement gives us credibility with users in situations where our reputation would otherwise be challenged," Zak said.

Attention Networking Professionals

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Control from page 9
where in that data glut are the relatively few but extremely important messages that could have saved network users some downtime — downtime that costs in lost productivity and revenue.
Based on the need for usable management data, vendors responded in the late 1970s with a new type of tool, the performance monitoring system. It was a significant step up for net management.
But the proliferation of network tools has created a management problem of its own — who will watch the watchers? The myriad of control consoles and the lack of coordination among operators can create near chaos in a busy network control center.
The solution to this new management problem is to unify and integrate the surveillance and control of network tools — performance monitors, security monitors, multiplexer and modem monitors, switch controllers, host monitors — into one unified network surveillance and control system.
This system would monitor and control all the tools in the network,

regardless of which vendor supplied the tool. Any tool with intelligence to report about itself or a piece of the network can report to the unified control system.
The system would filter out messages of no consequence. It would capture, prioritize and display messages that network managers need to know about. And it would access and control any of the individual tools by emulating them. Of course, the system must stay open to newly developed tools, as well.
What is the value of unified surveillance and control? It can eliminate unneeded data, unnecessary terminals and the guesswork and confusion that now exists in many network control centers. It can help operators focus on critical problems without digging through pages of printouts to find buried but important information. And because all critical messages are captured and displayed, there is less chance that an important alert will go undetected.
Unified network surveillance and control has clear value for both corporate and operations management.

TELECOM TRENDS

AT&T and Rockwell International team up

Rockwell International Corp. and AT&T last week penned an agreement through which AT&T will supply its Conversant Model 32 and Model 80 speech-recognition systems as optional equipment for Rockwell's Galaxy automatic call distribution systems. One user of the two systems, Fidelity Systems in Boston, is giving its customers 24-hour, secure telephone access to quotes on as many as 6,000 stocks and securities.

AT&T direct distance dial rates and discounts

Rate mileage	Rates	
	Initial minute	Each additional minute
1-10	\$.31	\$.16
11-22	\$.37	\$.21
23-55	\$.41	\$.24
56-124	\$.43	\$.28
125-292	\$.44	\$.30
293-430	\$.45	\$.32
431-925	\$.47	\$.33
926-1,910	\$.48	\$.34
1,911-3,000	\$.55	\$.36
3,001-4,250	\$.58	\$.39
4,251-5,750	\$.60	\$.41

Rate discount chart

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
8:00 a.m. to 5:00 p.m.	Day rate period Full rate					Evening 40%	Evening 40%
5:00 p.m. to 11:00 p.m.	Evening rate period 40% discount						
11:00 p.m. to 8:00 a.m.	Night & weekend rate period 56% discount						

SOURCE: AT&T

VSATS

United Video undercuts mart

Basic service to cost \$1,000 per drop.

BY JOHN DIX
Senior Editor

TULSA, Okla. — United Video, a satellite common carrier in the broadcast industry, is readying a very small aperture terminal satellite service designed for general business applications, which, at \$1,000 per network drop for bare bones data support, is less than a sixth the cost of other Vsat services.

The one-way, point-to-multi-point Subcarrier System Service, which is scheduled to be cut over Sept. 15, will support data transmission at speeds from 2,400 bit/sec to 1.54M bit/sec T-1 rates and broadcast quality audio signals.

The service uses 1.8-meter receive-only earth stations and C-

band subcarrier satellite frequencies, a technology mix that is "nothing new or tremendously fantastic," according to Albert Stem, general manager of the service. "One of our goals was to use existing, widely available technology."

United Video cut its teeth on satellite subcarrier technology in the broadcast industry, where it adopted the technology to provide nationwide distribution systems for cable television operators and providers of radio programs. The company distributes programming for the Satellite Music Network, the largest satellite delivered radio network in the country, with close to 1,000 affiliated stations.

Subcarriers have traditionally been used with video broadcasts to
See Vsat page 14

GTE LABORATORIES

Mux twins fiber capacity

Device may trim costs for large users.

BY MICHAEL FAHEY
Staff Writer

WALTHAM, Mass. — GTE Laboratories last week announced that its researchers have developed a fiber-optic multiplexer that can double the voice and data transmission capacity of existing fiber networks.

The development could result in significant savings for telephone companies and other large users by reducing their need to lay new fiber-optic cable when they reach the capacity of current systems, a GTE spokesman said. It can cost \$50,000 to install 12 miles of fiber.

Bill Reed, an analyst for Link Resources Corp., a New York-based market consulting company, said US Sprint Communications Co. may be the most immediate beneficiary of the new device.

US Sprint is half owned by GTE Corp., having been recently formed by the merger of GTE Sprint Communications Corp. and US Telecom, Inc.

New carrier's role

The newly formed long-distance

carrier, which has plans to lay a nationwide fiber-optic network, will field test the GTE technology by the end of this year.

The spokesman said the new, matchbook-sized multiplexer, which took five years to develop, is the first practical and efficient way to send two distinct light signals through the same optical fiber without signal deterioration.

Until now, wavelength division multiplexers could not send two separate signals within a single optical fiber without being precisely and permanently tuned to the frequencies of the specific laser serving as the source of the transmitted light signal.

Unless a multiplexer was precisely tuned, the spokesman said, severe distortion would occur in one or both of the signals. This pre-tuning can be expensive and time-consuming, the spokesman said.

As a result, many fiber-optic communications system operators have avoided use of multiplexers in favor of the tried-and-true single-channel fiber systems, the spokes-

See GTE page 14

CROSS TALK

JOHN DIX

New breed of carriers labels giants lethargic

AT&T has to be getting nervous. Competition is competition. But there are lean, hungry long-haul carriers out there that make even the giant's traditional competitors look like sluggish, tolerable nuisances.

The state of Louisiana recently began installing a network provided by LDX Net, Inc. of Chesterfield, Mo., one of the new breed.

Requirements of the contract would have been a joke two years ago.

Picture a customer looking for a network to replace his AT&T net that would:

- Consist purely of fiber optics to ensure clean transmission quality.
- Slash voice and data network costs by nearly \$10 million per year.
- Provide usage-sensitive billing to accommodate potential decreases in network traffic

brought on by recessions.

- Offer a five-year contract to preempt tariff rate hikes.
- Carry a 30-day escape clause in case better deals surface within the next five years.
- Include end-to-end network management, even for tributary circuits provided by other telephone companies.
- Provide one point of contact for network problems.
- Provide four-hour response time for repairs.
- Provide repairs at a fixed five-year rate.
- Carry a \$200 penalty for every hour or portion therein that the network is down.
- Be installed free.

These contract provisions sound laughable even today.

But an AT&T account group in Louisiana isn't laughing. AT&T lost the bid. It was undercut by \$9 million. AT&T wasn't able to, or didn't care to,
See AT&T page 14

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► MARKETING INNOVATION

Advertisers may reach out and grab callers if start-up firm has its way

Phone Spots, Inc. seeks patent on telephone ad insertion idea, would inject four-second commercial blitzes between rings.

BY JOHN DIX
Senior Editor

WESTON, Mo. — A start-up company here has filed for a patent on a concept that would enable telephone companies to make money by selling advertisements that callers would hear while waiting for calls to be answered.

Phone Spots, Inc. field-tested its Soft-Ads concept with Fidelity Telephone Co. in Sullivan, Mo., last year, and the company is now seeking telephone company licensees, according to Neil Sleevei, president and founder of the firm. Sleevei is a telephone engineer and a former AT&T employee.

With Soft-Ads, telephone companies could sell roughly four-second spot advertisements that would be injected between the rings callers hear while waiting for the called

party to answer the phone. Sleevei said the ads would be aired during the first or second pause between rings to ensure that the ad was broadcast before the call was answered or before an unanswered

provide advertisers with accurate accounts of who heard what advertisement when.

This could also enable the telephone companies to vary their rates according to peak calling peri-

“Telephone companies could subject all callers to advertisements, with the exception of those who pay to have them turned off.”

call was disconnected.

Although most local service is not billed on a usage basis, the phone companies monitor phone use, which would enable them to

ods and to provide advertisers access to certain demographic areas as defined by telephone exchanges.

Sleevei said that it may be possible for local telephone companies to

use advertising subsidies to replace telephone users' fixed monthly service fees. These telephone companies, Sleevei reasoned, could waive monthly service fees for customers willing to listen to advertisements between rings. He maintains that some advertisers — for example, the Social Security Administration — want to reach low-income families, and so the system may help those that need it most.

Five of the six system deployment methods outlined in Sleevei's patent involve employing the technology at the central office switch where calls are originated. This would involve monitoring the ring generated by the remote central office and injecting the advertisements at the appropriate time. While it would be easier to insert the advertisement at the source of the ring, callers who opted against the advertisements would still be subject to them when calling into a remote exchange.

Sleevei said the system concept could also be used with private switch exchanges to broadcast corporate messages to employees. Although Sleevei did not mention it, telephone companies could subject all callers to advertisements, with the exception of those who pay to have them turned off. □

Vsat from page 11

carry an accompanying audio signal. Although satellite transponders only carry one video signal, Stem said there is enough bandwidth left over to support two or three subcarriers. United Video will use these “baby carriers,” using frequency division multiplexing to support clients.

Stem said Subcarrier System Service makes the best of existing transmission technologies. The service combines commonly available electronic components with small-diameter antennas, inexpensive down-link electronics and a satel-

lite space segment, Stem said.

Optimization of transmission parameters and signaling methods enables the company to meld these pieces into systems that are immune to terrestrial microwave interference and rain fading, the latter being a problem for operators of Ku-band Vsat systems.

United Video overcame the terrestrial interference problem — which has encouraged most other Vsat carriers to use Ku-band systems — by carefully positioning the subcarrier frequencies in gaps within the ground-based, microwave frequency band. This eliminates 90% of interference problems, Stem claimed.

Remaining interference is eliminated by limiting the number of signals broadcast and increasing their power, he said.

“If you want to send data through a channel, you can either use a lot of bandwidth and a little bit of power or a lot of power and a little bandwidth,” Stem said. “Most satellite systems use a balance, a moderate amount of power and bandwidth. To use small antennas, carriers like Equatorial Communications Co. decided to go with low power and wide bandwidth. Our system is the exact opposite, high power and narrow bandwidth.”

Besides eliminating interference, this signal power level enables United Video to use C-band frequencies to broadcast high-speed data and high-quality audio to small, 1.8-meter antennas.

Stem claimed that other Vsat vendors operating in the C-band offer data support up to 19.2K bit/sec today, with promise to support 56K bit/sec in the future.

Subcarrier System Service will be able to support data rates up to T-1 1.54M bit/sec and bandwidth-intensive high-quality audio signals that rival the quality of laser compact-disc players, he said.

Use of industry standard components contributes to the company's ability to offer low-priced Vsat stations. United Video's roughly \$1,000 terminal can support data at speeds up to 19.2K bit/sec and includes the antenna, signal converter, receiver and signal demodulator. Encryption and addressability can be added for another \$600 per station, Stem said.

Data integrity ranges from one error in 10⁻⁶ to one error in 10⁻¹², de-

pending on the level desired by the customer. The equipment is made to United Video's specifications by Wegener Communications, Inc. in Atlanta and International Satellite Systems Engineering, Inc. in Menlo Park, Calif. The company is reportedly talking to three other station manufacturers interested in making products to its design.

Besides station costs, the service includes a fee of \$6,000 per month, regardless of the number of network drops. Included in that fee is satellite space segment costs and shared use of United Video's mas-

GTE from page 11

man said.

The new multiplexer, he said, not only makes it possible to transmit two signals simultaneously, it enables those signals to be transmitted in both directions.

This development expands the interactive potential of fiber optics and could spur increased use of new technologies.

As an example, the spokesman said, the multiplexers could be used in interactive cable television systems that allow subscribers to answer questions or order products.

The GTE spokesman said many telephone operating companies have voiced strong interest in the new multiplexer, as have military and private communications network operators.

Reed of Link Resources cautioned, however, that an overabundance of existing fiber-optic cable may blunt the immediate impact of the new multiplexer.

“There may be enough fiber-optic cable out there to carry everyone's conversations around the country 10 times without new multiplexing technology,” he said. □

AT&T from page 11

meet many of the stipulations spelled out in the proposal.

Indeed, few carriers would be able to meet those provisions, or would want to. Hungry as they are, MCI Communications Corp. and US Sprint Communications Co. are still too wrapped up in precedents and tariffs to carve out daring and innovative service contracts like this LDX Net bid.

The Louisiana bid was not a small contract. And not a contract the top long-haul carriers can brush off as a freak award. While AT&T, MCI and US Sprint continue to wage nationwide battles, smaller regional carriers are walking away with sizable accounts.

As fierce as the long-haul competition is today, it can only get worse as more new carriers get fiber in place and contribute to the growing capacity glut.

Perhaps the most telling Louisiana contract provision was the 30-day escape clause. As unbelievably sweet as the state's contract with LDX Net is, the state had the foresight and presence of mind to realize that this is just the beginning. □

“Most satellite systems use a moderate amount of power.”

FACTORY COMMUNICATIONS

► ANALYSIS

AT&T clawing for factory turf

Workstations vanguard of assault.

BY BOB WALLACE
Senior Writer

AT&T recently staked its claim to a larger role in the increasingly crowded factory network market with the introduction of two industrial workstations. The company claims it is also developing computer and networking products to be introduced at a later date.

The industrial workstations, modified versions of the company's PC 6300 and PC 6300 Plus personal

computers, reportedly can be linked to broadband, Manufacturing Automation Protocol-compatible, local-area networks. The devices have been outfitted with equipment such as special fans, filters and housing. This equipment is designed to ensure reliable operation of the workstations in harsh environments.

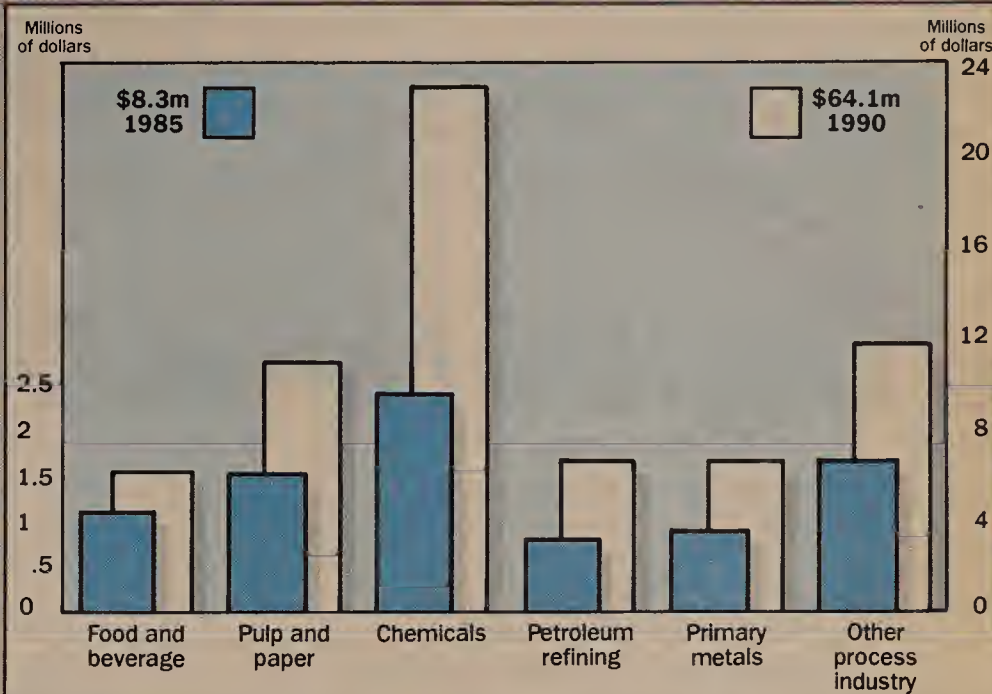
Factory networking has been one of the weakest segments of AT&T's market efforts. Although it

See **Turf** page 16

“The impending loss of the investment tax credit would slow automakers' plans to implement MAP technology in their plants. It will definitely slow Electronic Data Systems' construction of General Motors Corp.'s national digital, voice and data communications network.

Dan McFarland
R.W. Beck and Associates
Washington, D.C.

Process control market for fiber-optic products



SOURCE: FROST & SULLIVAN, INC., NEW YORK

FACTORY FACTS BOB WALLACE

Users must galvanize to battle budget cuts in OSI research

Users stand to lose the most if the National Bureau of Standards' (NBS) Institute for Computer Sciences and Technology's (ICST) funding for fiscal year 1987 is not restored to \$10.2 million. NBS originally submitted a \$10.2 million budget request, but budget-cutting efforts trimmed that figure to roughly \$8.2 million.

This group might face additional budget cuts because the federal government has been forced to chop another \$20 billion off the planned \$164 billion national budget for 1987 as a result of stipulations in the Gramm-Rudman balanced budget tax legislation.

NBS activities that may be curtailed by planned and possible future budget cuts include the Open Systems Interconnect (OSI) project and the standards group's computer security program.

Charles Gardner, chairman of the U.S. Manufacturing Automation Protocol/Technical Office Protocol Users Group Steering Committee, recently began rallying user support for 100% funding of NBS's ICST. Gardner sent letters to all members of the users group asking them to contact key legislators with the power to champion NBS' budgetary cause. The literature claims user inaction on this critical issue may cost NBS \$2.1 million.

The reduction of the ICST's budget could slow both users' plans to implement and vendors' plans to produce

OSI-compatible networking systems. Such a move may also directly impact the MAP movement. ICST budget cuts would undoubtedly affect testing groups such as the Industrial Technology Institute (ITI), of Ann Arbor, Mich. ITI labors to separate the MAP pretenders from networking products that are genuinely MAP-compatible. ITI runs interference for users who are confused about what networks are compatible with the factory communications specification.

NBS' OSI project, the group's largest enterprise, involves the development of test methods and parameters that are used by testing groups to determine whether products conform to OSI and other OSI-based networking specifications such as MAP and TOP.

Although the NBS does not perform network testing services, groups such as the Corporation for Open Systems (COS) and the ITI rely heavily on OSI testing tools and related research. ITI regularly conducts tests that determine if vendors' products conform to MAP Version 2.1, the current version.

NBS' computer security project has devised and maintained the Data Encryption Standard (DES) that is widely used by the government and was originally developed by the National Security Agency.

Users should back the efforts of the

See **Budget** page 16

INCIDENTALS

Digital Equipment Corp. recently signed an agreement with Chipcom Corp. that will enable DEC to sell Chipcom's two-port Ethernet and Ethermodem Frequency Translator.

Chipcom's equipment allows users to operate Ethernet local nets at speeds up to 10M bit/sec over coaxial cable.

Chipcom products allow Ethernet networks to coexist with other networks on a broadband system.

For example, a user could operate a broadband Ethernet network; a Manufacturing Automation Protocol system, an IBM PC Network and a Sytek, Inc. Localnet 20 system simultaneously over a single broadband network.

The Society of Manufacturing Engineers (SME) announced the availability of a 168-page hardcover book that examines Toyota Motors' development of the Just-In-Time manufacturing system.

The book, entitled *Kanban and Just-In-Time at Toyota*, is priced at \$29.95. To order the book, contact SME at (313) 271-1500, ext. 418 or 419.

A conference and exposition dealing with Group

Technology will be held Sept. 30 to Oct. 2 at the Dunfey City Line Hotel in Philadelphia.

"Group Technology: a Users' Forum," will be co-sponsored by SME and the Computer and Automated Systems Association of SME (Casa).

Group technology is a management philosophy based on the recognition that similarities occur in the design and manufacturing of discrete parts. The philosophy offers users the promise for improving the overall productivity of batch manufacturing operations.

For additional information on the group technology conference, contact SME at (313) 271-0039.

Casa is sponsoring "Group Technology & Computer-Automated Process Planning," which will be held on Oct. 9 at the Bay-side Exposition Center in Boston.

Seminars at the show will examine group technology, Just-In-Time manufacturing, Cellular Manufacturing and other manufacturing methods.

For additional information on the conference, contact Casa at (313) 271-1080, ext. 365.

Turf from page 15

offers its Starlan local-area network as a factory-floor network solution, the company does not produce broadband local-area networks — the type of system large user companies like General Motors Corp. and Ford Motor Co. have begun installing in their manufacturing facilities.

While IBM has labored to fill in the gaps in its industrial networking line, AT&T has yet to develop a significant array of factory networking gear. Those defending AT&T would counter by noting the company's participation in the 21-vendor Autofact '85 MAP demonstration. AT&T did contribute an internetwork router to the massive factory floor/technical office

networking demonstration. But users realize that an internetwork router does not a factory network make.

AT&T does not market a local-area network that complies with the IEEE 802.4 (token-passing bus) specification that has been adopted as the physical layer of all MAP specifications to date. While both start-up and long-established factory network vendors have brought MAP-compatible nets to market, AT&T has yet to add a MAP-compatible offering to its current family of local-area networks.

Harvey Freeman, vice-president of the Minneapolis-based Architecture Technology Corp., predicted that AT&T would not be able to bring factory networking products

to market for at least one year. "AT&T is just beginning to enter the industrial networking market. What they need is a factory net compatible with the IEEE 802.4 token-bus specification," Freeman said. "AT&T will also need a gateway that would allow its Information System Networks to be linked to whatever token bus-based factory net they might offer."

In contrast, IBM started off 1986 with a bang, inking a joint product development agreement with Industrial Networking, Inc. (INI) on the eve of the MAP users group meeting in Toronto in mid-January. The agreement called for the two companies to develop jointly MAP-compatible products. IBM has been tight-lipped on the details of the

nine-month-old agreement with the start-up, whose MAP-compatible local net has already received wide acclaim. INI, a factory net vendor owned by General Electric Co. and Ungermann-Bass, Inc., manufactures MAP/One, a local-area network that is fully compatible with the MAP 2.1 specification.

Both GM and Ford have chosen to implement MAP/One in their first MAP production facilities. MAP/One will be used in GM's three-plant Truck and Bus project. Ford has already installed MAP/One in its Rawsonville, Mich., plant.

IBM's relationship with INI has no doubt made IBM privy to INI's MAP technology. IBM's manufacturing display at the Robots 10 show in Chicago in April featured multiple INI MAP interface cards as well as an INI head-end remodulator. Although IBM consistently asserts it does not and will not resell INI products, IBM has made it clear to manufacturers that the INI cards can be used to link IBM's industrial computers to a MAP local-area network.

IBM has also devoted much time this year to developing and studying MAP technology. The company has already implemented a MAP pilot network in its Endicott, N.Y., plant. Users can expect any data garnered from this hands-on networking project to be used toward the production of MAP-compatible products from the networking giant.

In addition, IBM has introduced a pair of MAP software programs for its Series/1 minicomputer. One program is designed to transform the mini into an applications server, the other enables the Series/1 to operate as a communications server. Both software programs are being used in the MAP pilot network.

AT&T, on the other hand, has maintained a low profile in regard to the MAP effort and factory networking in general. Lou Weigle, industrial data communications manager for AT&T, claimed the company is implementing two pilot MAP networks. But AT&T has been tight-lipped about the MAP projects. Weigle would only say one test would be in a process manufacturing facility while the other would be housed in an assembly-type factory. Weigle said AT&T will use its own networking products — ISN and Datakit — in its advanced manufacturing facilities. □

Budget from page 15

MAP/TOP Users Group and other parties to restore full funding for the nation's most important networking standards organization. These users, however, would be best advised to try to thwart future attempts to further decrease ICST's budget, rather than focusing on the recapturing of the \$2 million already cut from ICST's fiscal year 1987 budget.

With the government looking to slash \$20 billion from the federal government's budget, it seems unlikely budget cutters would be interested in restoring already chopped budgets. □

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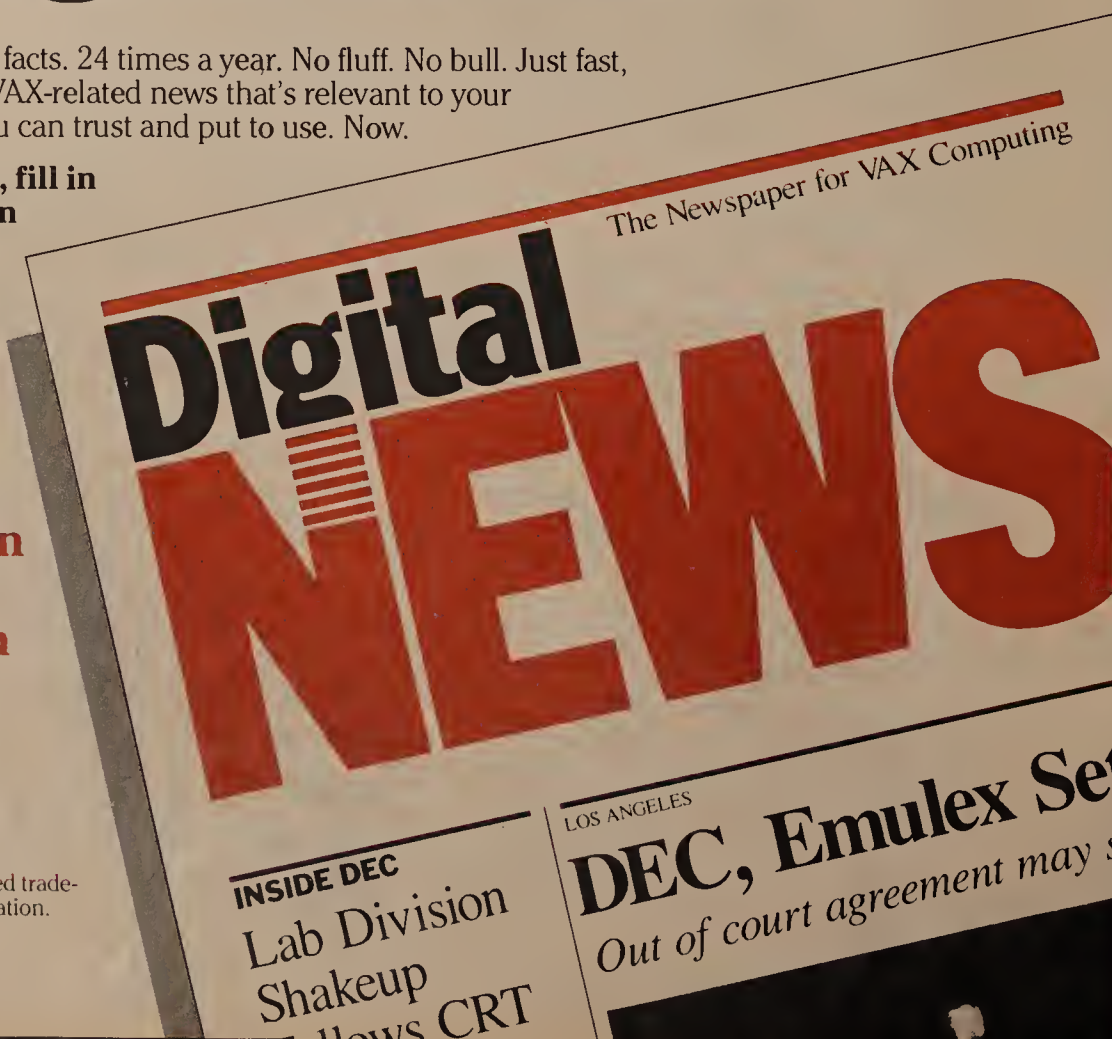
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DATA DELIVERY

“The emergence of new technology for sparing and switching, specifically matrices, is eroding the user base for patching equipment. The patching marker will experience flat growth over the next few year.

Digital Switching Markets
International Data Corp.
Framingham, Mass.

Modem descriptions

CCITT standard	AT&T equivalent	Line type	Application (full or half duplex)
—	103	Dial-up/leased	300 bit/sec full
—	202	Dial-up/leased	1,200 bit/sec half
V.22	212	Dial-up/leased	1,200 bit/sec full
V.26	201	Dial-up/leased	2,400 bit/sec half
V.22bis	—	Dial-up/leased	2,400 bit/sec full
V.27	208	Dial-up/leased	4.8K bit/sec half
V.26ter	—	Dial-up/leased	4.8K bit/sec full
V.29	209	Dial-up/leased	9.6K bit/sec half
V.32	—	Dial-up/leased	9.6K bit/sec full
V.33	—	Leased	14.4K bit/sec half
—	—	Leased	16.8K bit/sec half
—	—	Leased	19.2K bit/sec half

NOTES:
1. Bell 212 and V.22 modems are backward-compatible with Bell 103 modems.
2. V.26 is compatible with Bell 201.
3. V.22bis is backward-compatible with V.22, Bell 103, 212 modems.
4. V.27 is not compatible with Bell 208.
5. V.29 is not compatible with Bell 209.
6. V.32 can only fall back to 4.8K bit/sec. Manufacturers may later place two modems (one lower speed) in same box in order to be compatible with lower speed modems.

SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

INTERVIEW

COS testing head speaks

Ian Davidson takes on OSI challenge.

Ian Davidson has his work cut out for him. Davidson, the newly appointed vice-president of technical products and services for the Corporation for Open Systems (COS), will oversee all of COS' testing activities, beginning with the development of the organization's testing center. COS' goal is to stimulate the development of interoperable communications products. In an initial step toward that goal, COS recently adopted its first communications specification, the National Bureau of Standards' (NBS) X.400 Message Handling Standard. Network World Staff Writer Nadine Wandzilak recently interviewed Davidson, who comes to COS from the National Computing Centre, Ltd., a private company in Manchester, England, that tests ISO protocol conformance. Davidson established and managed NCC's testing center.

See COS page 18

IBM INSIGHTS

Something up my sleeve. Octel Corp. has been telling prospective customers that it will have a voice messaging system that works with Rolm Corp.'s CBX line by the end of the year.

A few months ago, Rolm announced it was phasing out its ETS phone sets. Octel had used those sets to integrate its wares with Rolm's offerings.

Octel users were upset with the announcement and hoped that the company would come up with an alternative. It appears that Octel is ready to roll out its solution.

No dice, Disoss. IBM's Disoss is not gaining acceptance in the Fortune 1,000 companies, according to a recent survey by Forrester Research, Inc., a Cambridge, Mass., consulting firm.

A survey of 70 companies found that only 22% had installed the product. Also, 4% of the respondents had actually tested the package and then decided to throw it out.

In place of Disoss, companies had installed peer-to-peer networks that used equipment from Wang Laboratories, Inc. and Digital Equipment Corp. Users said that Disoss was difficult to use and was poorly integrated with other IBM offerings.

IBM attempted to overcome some of these shortcomings with a series of System/36 announcements in June.

It will be interesting to see if the enhancements will help Disoss to gain corporate acceptance.

See Insights page 18

DATA DIALOGUE

PAUL KORZENIOWSKI

Data dialogue ditties

Who's on first? Network Equipment Technologies Co. (NET) has been attracting a great deal of interest. The start-up T-1 multiplexer manufacturer, based in Redwood City, Calif., has taken the high end of that market by storm and gained a foothold in many large corporations. For the past few months, the company has been closely linked with IBM. NET has taken part in joint sales presentations with IBM, Rolm Corp. and MCI Communications Corp. personnel. Consequently, a number of analysts speculated that IBM may gobble up the company before it files a public offering.

Recently, rumors of discontent from both IBM and NET surfaced. IBM is reportedly unhappy because NET is unwilling to cater to all of Big Blue's whims. NET thinks that rumors of an eventual IBM buy-out are hurting potential sales and hindering the company's growth plans. Neither company will even acknowledge that any type of relationship exists, so the rumors will continue until IBM buys or tries to bury NET.

Whither the gateway? Recently, gateways have been attracting a lot of attention. These hardware and software packages typically link local-area networks to larger corporate net-

works. Eric Killorin, president of Hyatt Research Corp., based in Andover, Mass., claimed that gateways are only a short-term solution. He said the gateway approach is often a cumbersome, inefficient manner of linking dissimilar systems. He expects gateways to be quickly replaced by more advanced types of con-

“NET thinks that rumors of an eventual IBM buy-out are hurting potential sales.”

nections, such as IBM's LU 6.2.

Might makes right. Never underestimate the stranglehold IBM has on this industry. The company has the uncanny ability to take less than elegant products and turn them into industry standards.

The System/36 and Disoss have been criticized roundly for a few years. Companies with the products agree that they are clunky office automation offerings.

Yet, there can no longer be any doubt that the two will emerge as standard office automation offerings in large and small Big Blue accounts.

The Disoss bandwagon is getting awfully crowded as most hardware vendors scurry to produce some type of Disoss support. IBM took some of the kinks out of the System/36's armor, and other departmental processor suppliers may see their sales curve take a dip or maybe even a nosedive. LU 6.2 quickly moved from a new offering to industry buzzword. If General Motors Corp. ruled the automobile industry like IBM rules the information industry, yuppies would be driving Buick Skylarks, whether they liked it or not, instead of foreign automobiles.

What a tangled web OEM agreements weave. Believe it or not, three companies basically supply just about all of the industry's microcomputer-to-mainframe links.

Chances are few users have ever heard much about

See Ditties page 18

COS from page 17

How are standards decisions made within COS?

COS members contribute to a body known as the COS Strategy Forum, the prime decision-making body at the technical level. The forum has a number of subcommittees to deal with specific technical issues. The subcommittees make recommendations to the Strategy Forum to approve. A standing committee on architecture is responsible for accelerating the development of an architectural framework consistent with established standards. To put it another way, the committee defines the COS protocol stacks as recommendations to the Strategy Forum.

The standards developed by standards bodies generally concentrate on a particular layer of the OSI model. You need to put together a number of standards to produce a functional stack or profile to support a particular application. To do that, you need to look at each of those standards and choose various options.

What has COS achieved thus far?
We've already made progress. The protocol stacks for File Transfer and Management (Ftam) and Message Handling Standard (MHS) have been addressed and the recommendations voted on by the Strategy Forum. They are the same as and are based on work that's been done in the NBS-[Open Systems Interconnect] workshop.

What is the size of COS staff overall and in the test area?
The projected staff should be about 90. Fewer than half are on board now. More than 50% of the staff will be in my division, the technical services side.

What backgrounds are you looking for in testers?
There aren't many people with the complete package of skills for which we are looking. Candidates have to have good knowledge of data communications and the OSI model and the whole range of protocols the model entails. We have to have people with good real-time software development backgrounds because we have a considerable amount of development of testing tools to undertake to support the protocol stacks that COS will be endorsing.

We will also be operating a test center at COS, and therefore we are looking for people skilled in the operation of test equipment and analysis of the results obtained by those tests.

What do you see as the major challenges for COS?
For the organization, the major challenge is to complete its start-up phase and have testing facilities available for its members in as short a time as possible.

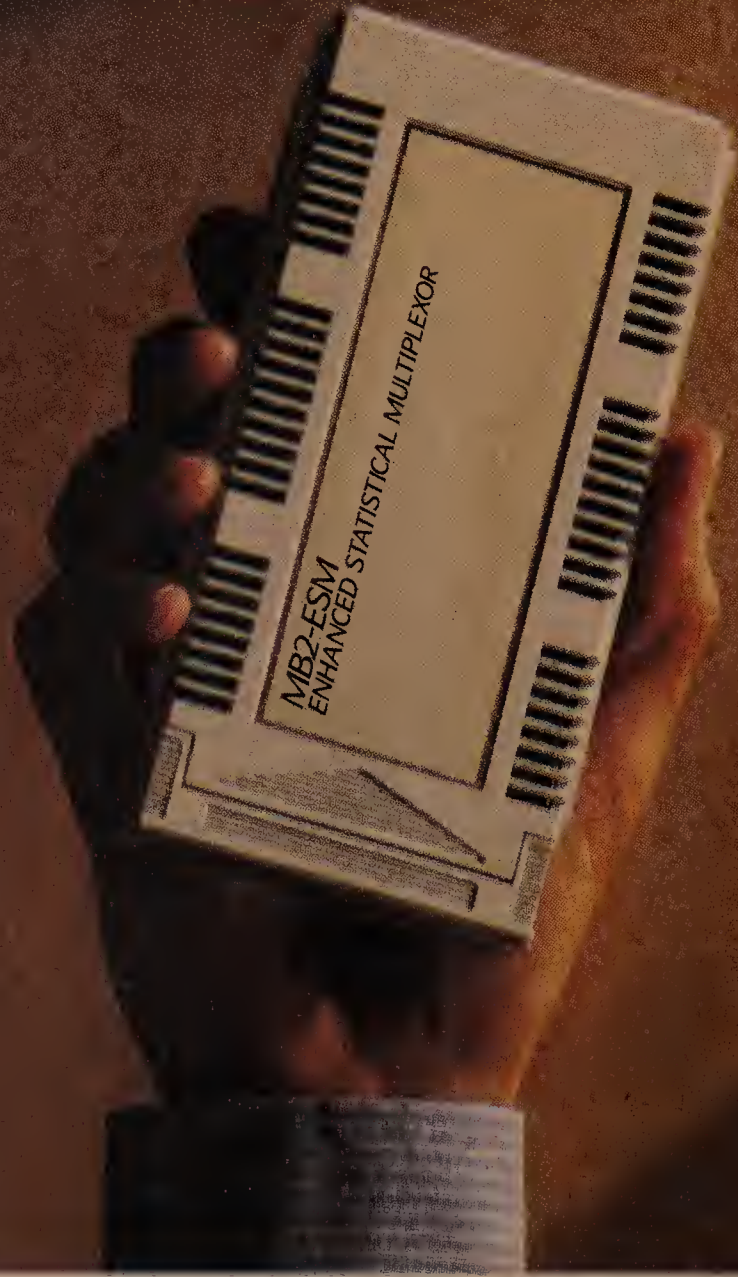
What is that time frame?
We are hoping to have test facilities available by the end of the first half of next year. The first pass at this problem is to call for proposals for test systems from outside orga-

nizations, companies active in developing such systems in the states and in Europe. An example would be my previous company. When you start from scratch and have nothing on which to build, actual development time is nontrivial. Many man-years of effort have already been spent on producing test systems. COS is shortening its start-up time by going to people experienced in these areas.

How do you compare your work at COS with your work at the National Computing Centre?
Both organizations are membership organizations. NCC is considerably older, about 20 years old. Its role is to promote the more effective use of information technology in the

UK. It was and still is user-oriented, with more user members than supply [vendor] members. My role at NCC was to establish and run a conformance testing center. It's been operational for two years.
COS is focused more on promoting and testing for OSI and the Integrated Services Digital Network. The major difference between COS and NCC is that there is considerably more funding here. COS members have recognized the strategic importance of this particular work and also that it is quite costly. Producing test systems is somewhat more difficult than producing what you're going to test. We need to accelerate the production of test systems. Otherwise the delay will impact product availability. **Z**

Finally,
a data concentrator
so unique
you'll want to keep
the box
it comes in.



Insights from page 17

Now, an office automation cheat sheet. Confused by the array of products available in an IBM office automation arena? Xephon Technology Transfer, Ltd., with headquarters in Berkshire, England, has put together a comprehensive guide to available office automation software. The guide, *IBM Compatible Office Solutions*, lists various packages and includes a lengthy, eight-section checklist of various capabilities. For the OA purchaser, the book, which sells for \$45, seems to be a real steal. For more information, contact Xephon at P.O. Box 4480, Winter Park, Fla. 32793, or call (305) 678-2133. **Z**

► ELECTRONIC MAIL

E-mail package for IBM nets gets so-so rating

First user lukewarm on Network Courier.

BY KARYL SCOTT

Washington, D.C. Correspondent

A first user of Network Courier, a local-area network electronic mail package, gave the product a lukewarm endorsement.

A large bank, which did not want to be identified, is using Network Courier in two small installations. Network Courier, developed

by Consumers Software, Inc. of Gilroy, Calif., runs on IBM's Token-Ring Network and PC Network as well as networks from Novell, Inc. and Ungermann-Bass, Inc. The product supports IBM's Network Basic I/O System (Netbios), a standard software interface IBM has defined for its local network systems.

According to a bank official

overseeing the installation, Network Courier works well in small work groups but has limitations that are preventing wider use of the product. "One file server cannot talk to another as the software is currently designed," the official explained.

The official cited the limitation of user names to eight characters as another problem. "Other than those few items, I'm fairly happy with it and, once these restraints are overcome, we will consider using it on a larger scale," he said.

Network Courier, a random-access memory-based package, notifies users of incoming messages while they are working with various applications. The E-mail package works as a background applica-

tion that can be invoked with one keystroke over an application the user is performing. It also allows a user to read and respond to incoming messages without leaving the foreground application.

This capability has proved to be the single biggest advantage the bank found with the E-mail package. "We have passive mail systems and public electronic mail systems, but what we needed was a system that could immediately notify someone of some important message," the official said.

"Network Courier works well in small groups."

Here's the box.

A quick look at the MICOM™ BOX will tell you this is no ordinary data concentrator. In fact, the MICOM BOX Type 2 is the most flexible to configure and easiest to install

data concentrator on the market.

It couldn't be easier to respond to new applications or to tariff changes. With six FEATUREPAK cartridges to choose from you can make the MICOM BOX function as a point-to-point async stat mux, a multipoint mux, or even a multiplexing X.25 async PAD. Simply select the desired FEATUREPAK™ firmware cartridge and plug it in.

EXPANSION'S A SNAP.

Inside the MICOM BOX you'll discover a microprocessor "engine" plus a modular system of circuit boards. And in minutes, you can expand the number of channels from 4, to 10, to 16. Add modems with automatic dial back-up. Or switch to digital service with an integrated DSU/CSU. All by just snapping in another board.

The user, not the factory, determines system parameters—such as flow control, data rate, and special host support. So you get greater flexibility, performance, and ease of installation.

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It's inexpensive to expand the number of channels or add modems. Field service calls won't slow you down. Non-technical personnel can install MICOM BOX upgrades using nothing

more sophisticated than a screwdriver.

Network managers can configure, monitor, and test the entire network from any async terminal anywhere on the system using our unique Command Facility software. In fact, our menus are so clear-cut that even first-time users can do it.

Finally, corporate executives, using simple arithmetic, can quickly prove that the MICOM BOX is the single most economical solution to increasing network performance and reducing telephone line costs.

THE MICOM BOX MAKES OBSOLESCENCE OBSOLETE.

The MICOM BOX Architecture is all you'll need to graduate from small, point-to-point, leased-line networks to a variety of cost-saving multipoint configurations.

Our integral modems are soft-controlled by the multiplexor itself. Auto dial back-up for failed leased lines is transparent. And data rates of up to 9600 bps are available.

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Quite simply, the MICOM BOX provides the low cost, open-ended answer to accommodating new

applications and emerging networking standards. So there's never a risk of obsolescence.

CONCENTRATE. IT'S CHEAPER.

Data concentration is fundamental

to your networking success. But now the rules are changing.

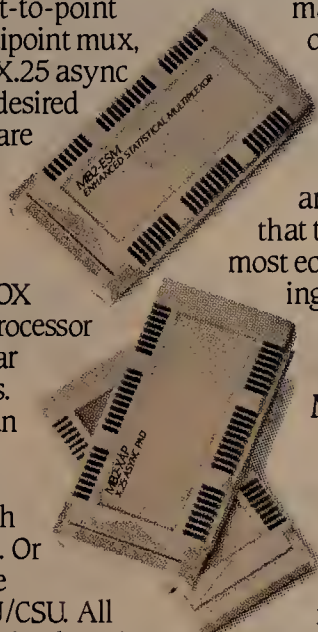
You must deal with deregulated and continually changing tariffs. A growing number of transmission technologies. The demands of desktop computers and distributed databases. And adapting to the various protocols of major vendors like DEC, DG, Prime, Tandem and HP.

That's why we developed the MICOM BOX. To bring together everything we've learned about making data communications less costly, easier to manage, and more adaptable to change. We've simplified every aspect of installation, daily usage, network expansion and troubleshooting.

As a result, one MICOM BOX and a handful of our FEATUREPAK cartridges are all you need to tackle a range of applications that would have previously required as many as 55 separate models. It's a system that changes as your company's needs change. Efficiently and economically.

That's what you'd expect from MICOM, the world leader in low-cost, multifunction stat muxes. Our experience makes us the only real choice for datacomm professionals who demand the best products and support.

The MICOM BOX. How did we ever pack so much into it? To find out, just call us at 1-800-MICOM-U.S. for a free 16-page brochure that details the reasons why the MICOM BOX is the data concentration solution you've been looking for.



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Network Courier allows users to assign priority ranks to messages and to create mailing lists for easy distribution. The receipt-requested feature will tell the sender if and when the message was read. Users can forward mail, reply to messages, send copies and include any DOS files as attachments to mail. All messages are encrypted.

Other early users include General Electric Co., Citibank NA, the National Academy of Science and Compaq Corp.

Network Courier represents the first generation of communications software designed expressly for use on a local-area network, according to the company. "This is the first package designed from the ground up to take advantage of the Netbios calls in the network," according to Jack Grushcow, president of Consumers Software.

The E-mail package also supports the International Standards Organization's X.400 electronic messaging protocol, which allows users to communicate with geographically dispersed computers over public packet-switched networks. □

Ditties from page 17

Communications Solutions, Inc., Micro Plus, Inc. or Micro-Integration, Inc. Yet these companies claim to have OEM agreements with almost all of the other link companies that add a few bells and whistles before taking credit for the product's development.

OEM agreements permeate the industry. Often, companies that develop technically sound products are too small to market and support their wares, so they turn these functions over to larger companies.

The small companies typically receive only a pittance of the royalties from these sales. Consequently, a few companies, Micro-Integration being one example, are attempting to move out of the OEM arena and into end-user sales. These companies may find themselves competing against products they developed themselves. Who says this industry is dull? □



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Behind the frantic scenes of a typical trading floor, a family's at work, keeping everything under control.

The DATAPHONE® II System family from AT&T is a series of integrated data communications products designed to

keep a computer network up and running. By constantly monitoring and measuring it, the DATAPHONE II Network Management System enables



2024T/2048T Modems

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are *Analog Modems* for point-to-point or multi-point applications. *Data Service Units* provide digital data transmission at a range of speeds along with the capability to handle added diagnostic tasks through our network management system. *Multiplexers*, an important part of network management, channel a number of low-speed lines into one efficient high-speed link.

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2600/2700 Series DSU



2248 Analog Switched Network Modem



THIS PLACE WOULD BE CHAOS.



724 T-MUX

your system up and running. Finally, AT&T's *Maintenance Operation Control Centers* (MOCC) provide remote monitoring and testing of your net-

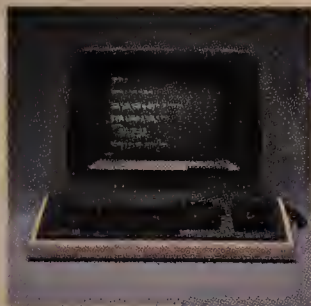
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“... your publication is a key place for Timeplex to be ... the editorial is covering networking issues of critical importance to major network users.”

Thomas E. Nunan, Director, Corporate Communications, Timeplex

Timeplex

June 24, 1986

Mr. F. Douglas DeCarlo
Publisher
NETWORK WORLD
375 Cochituate Rd.
Box 9171
Framingham, MA 01701

Dear Doug:

I had the opportunity last Friday to view the videotape of the NETWORK WORLD focus group in which eleven telecom and network managers from a wide range of major businesses and educational institutions participated. Two key points emerged.

- o A major issue with all the participants was vendor support before and after the equipment sale
- o Another major issue was equipment compatibility with existing and future worldwide standards

It's encouraging to us at Timeplex that NETWORK WORLD's target audience is heavily concerned with the very same issues we are raising in our current corporate advertising program.

Two other points about NETWORK WORLD which make us feel your publication is a key place for Timeplex to be:

- o The budget/spending responsibility of the focus group participants -- a solid indication of the overall buying power of NETWORK WORLD's circulation
- o The editorial climate -- covering networking issues of critical importance to major network users

Keep up the good work!

Best regards,



Thomas E. Nunan
Director, Corporate Communications

TEN/ar

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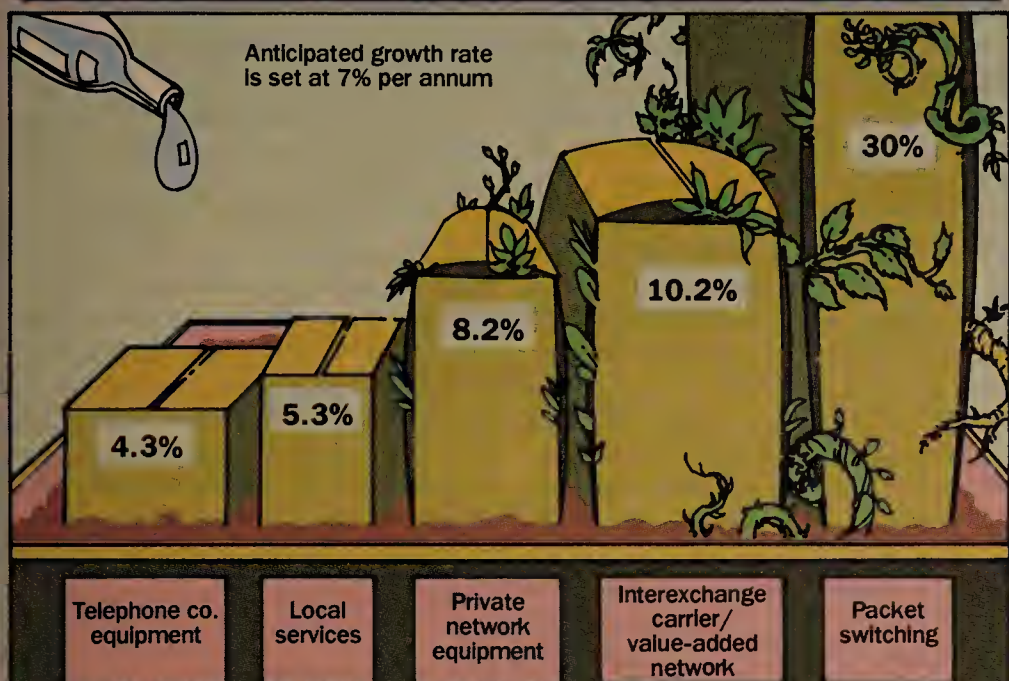
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COMMUNICATIONS MANAGER

Net management mart

The total industry market size for network management services is approximately \$35 million in 1986 and could reach \$200 million by 1990, according to a report issued by Hambrecht & Quist Venture Partners, a San Francisco-based market research firm.

U.S. telecommunications market poised for growth



SOURCE: NORTHERN BUSINESS INFORMATION INC., NEW YORK

GUIDELINES

ERIC SCHMALL

Keeping tabs on the cost of downtime

Network managers can gain profound insight into network costs by contemplating this Zen koan, or intuition-strengthening paradox: What is the cost of a network when it disappears?

Calculating the costs or ongoing expenses of a communications network is a relatively straightforward process. These costs comprise depreciated accounts for owned hardware, leased expenses, recurring service costs and maintenance expenses. Network financial management attends closely to these major components.

Much less apparent, however, are the costs to the organization when a line, node or single device fails and thereby denies a user access to the flow of information. Losses in productivity, timely information or customer goodwill can all combine to make the actual network expenses pale in comparison.

It is possible that a network that costs \$1 million annually to operate could easily cost an

organization \$5 million in lost productivity or opportunity through network failures, extended downtime or consistent disruption.

By knowing what the relative costs of downtime are, the manager will be able to more easily cost-justify a number of critical components for his network. Among the more notable examples are diagnostic aids to ease the process of problem identification and system restoration; redundant boxes at critical network junctures such as spare modems, concentrators, multiplexers or front-end processors; and dial back-up facilities to supplant critical leased lines that have failed. During the traditional annual budget battle, these components, are the most vulnerable to budget ax wielders. However, they can be saved by an intellectually honest assessment of their importance.

First a determination must be made concerning the "average" network user's productive hourly wage. Obviously, some facilities will have higher paid users than others. A manager could devote extra effort to segmenting users by productivity.

See **Costs** page 24

Schmall is network systems manager for an insurance holding company.

LOCAL-AREA NETS

The roots of network failure

Overblown expectations and lack of needs-definition deserve the blame.

BY MARY PETROSKY

West Coast Correspondent

After struggling with a poorly functioning personal computer local-area network for five months, an unhappy user in New Orleans recently filed suit against several of its product vendors.

Frustrated by a seemingly endless series of fixes applied by the consultant who installed the local net, the dissatisfied user gave up and decided to sue IBM, Novell, Inc., MicroPro International Corp. and a local consultant for the cost of the equipment, a replacement system and lost productivity.

The case illustrates the types of problems an increasing number of users are facing with networking tools that fail to support the applications for which they were intended.

The problem is not always a lack of equipment functionality. Failures often rest with users' inability to define specific networking needs. Had precautions been taken prior to the equipment purchase, the user could have avoided going to court.

"Any vendor can be held accountable if its product doesn't do what it was intended to do," says the user. See **Failure** page 24

"With precautions, the user could have avoided court."

ASSOCIATIONS

The National Users Association (NUA) will hold its fall meeting in conjunction with the Sytek User Group, Oct. 6-10, at the Denver Westin hotel.

User presentations will include examples of how to manage local- and wide-area networks. For more information, contact the NUA at (703) 683-8500.

William McGowan, chairman of the board and chief executive officer of MCI Communications Corp., will address the National Telecommunications Education Committee (NTEC) of the North American Telecommunications Human Resources Council on Oct. 6-7 at the Hyatt Regency Chrystal City Hotel in Chrystal City, Va.

The NTEC annual conference will include seminars in designing telecommunications training jobs, finding and selecting telecommunications textbooks, curriculum review work groups and site tours of training facilities.

For more information, contact John Buescher or Mollie McOwen at (202) 296-9800.

Division Council 20 of the Association for Systems Management will sponsor the Northwest Systems Conference on Sept. 10-12, in conjunction with the Expo '86 World Exposition in Vancouver, B.C.

The conference theme is "Future Systems Exposure." For more information, contact Richard Ritchie, CSP, registration director at (604) 879-6272.

Division Council 11 of the Association for Systems Management will meet in Battle Creek, Mich., Oct. 16. Michael Kolowsky, dean of continuing education, at Hillsdale College, Hillsdale, Mich., will present "Characteristics of Effective Leaders."

For more information, contact Daniel Willison, CSP, (616) 323-6851.

The Society for Management of Professional Computing will hold a luncheon meeting on Sept. 19 at Anthony's Pier IV in Boston. For more information, call (617) 266-6800.

PEOPLE

Barry Stuttard was promoted to senior vice-president at Racal-Milgo, Inc.

John Ricketts was appointed to vice-president of process and device engineering at General Instrument Corp. Ricketts was most recently an engineering manager for Harris Corp.

Frank Matyac was appointed corporate telecommunications manager at Litel Telecommunications Corp. He was most recently a business telecommunications analyst.

Peter Marshall was appointed deputy director for broadcast services of the business planning and services development division at the International Telecommunications Satellite Organization.

Marshall was most recently the general manager and acting chief executive of Visnews Ltd. in London.

Gary Gunderson was appointed general manager of communications systems operations at Computer Consoles, Inc.

Gunderson was most recently director of special long-distance services at AT&T.

Sheppard Greene has joined Private Satellite Network, Inc. as director of BTV Productions. Greene was most recently manager of AT&T's ad hoc teleconference production service.

William McDonald was named president of United Telephone Co. of the Northwest.

McDonald is currently senior vice-president of network development for US Sprint Communications Co.

Kathleen Flaherty was named vice-president of communications network services for MCI Northeast, a division of MCI Telecommunications Corp.

Edmund Tomlinson was appointed senior vice-president of Digitech Communications, Inc.

Murray Weidenbaum was elected to the Contel Corp. board of directors. Weidenbaum presently heads the Center for the Study of American Business at Washington University in St. Louis, Mo.

Wanted:
If you are a recently promoted communications manager, or if a member of your technical staff has changed positions within the communications department, Network World would like to hear from you. Please send your name, new title and information describing your present and former position to Network World, 375 Cochituate Road, Box 9171, Framingham, Mass. 01701.

Failure from page 23
what it's supposed to do. I think the big problem here is that frequently there is a lack of communication between the people who are buying and the people who are selling," said Thorne Harris III, an attorney at the Law Offices of Thorne D. Harris in New Orleans. Harris represented MicroPro in the

“Overblown expectations of what technology can accomplish are creating problems for many users.”

New Orleans lawsuit. "It's quite possible to buy a half-dozen products and each works as advertised, but together they still won't solve your networking problem."

Overblown expectations of what technology can accomplish are creating problems for many users, said Peter Frank, a partner at Price Waterhouse in Los Angeles. "There are a lot of people out there who are disappointed in the technology. Five years ago, creating a personal computer network was considered a fairly technical task. Today, people think they can slap things together and have a solution," Frank said.

Trying to get multivendor equipment to work together is one of the key problems facing local-area network users. "Interface considerations increase, and you end up with a lot of finger pointing by vendors if products don't work together," said Roland Watts, Frank's partner and colleague at Price Waterhouse.

Overblown expectations and miscommunication also plague the

Costs from page 23
menting and arraying the relative cost of each line, based on various wage factors. Even so, it is important to establish an overall average cost so that some universal assumptions can be made.

Lost wages
For example, suppose one determines that the average network-connected user is paid \$10 per hour and that 25 such users occupy one particular circuit. If that circuit fails for 2 hours during normal productive hours, the lost wage factor would be figured as: \$10 per hour times two hours times 25 users, which equals \$500.
Now suppose the entire network is temporarily lost, for example, front-end processor failure. Assume it takes four hours to restore service to a total of 1,000 users, who each earn that same \$10 per

telecommunications field, according to Dick Bernacchi, partner with Irell & Manella, a Los Angeles law firm. "These problems exist and have been aggravated by the break-up of AT&T and a more competitive environment where the vendors are more aggressive in their marketing," said Bernacchi, co-author of a recently published guide to the legal and management aspects of computer technology.

Overzealous salespeople are one source of potential problems, Bernacchi said. Vendors hoping to close a sale will sometimes make commitments they can't keep or overstate the capabilities of their products and services. Users should not count on oral commitments by vendors regarding delivery or performance of products or services, but should instead view a written contract as their only firm agreement. "The industry is moving so quickly, it makes it difficult for the buyers to protect themselves," Bernacchi said.

Some companies are writing their own purchase agreements for vendors, which include the warranties the users want, Bernacchi added. "Most warranties are of a relatively limited nature, if they're offered at all. They may only state that the product will work as specified," he said. "The problems usually come when a system doesn't meet a business requirement. No warranty is likely to deal with that issue." Like Bernacchi, Price Waterhouse's Frank encourages users to negotiate for a warranty they can live with. "You're not stuck necessarily with the warranties offered by the vendors," Frank said.

Users should try to get vendors to commit to a minimum level of performance for their products, Bernacchi said. In these competitive times, users will find vendors more willing to take responsibility for their products and provide a specified level of support and upgrades, he added. The higher the ticket price of the equipment or service, the more risk the vendor is likely to take. However, Bernacchi points out, "Most vendors will absolutely refuse to take an unlimited risk."

hour wage. This central node outage has just cost the organization \$40,000 in lost wages (\$10 per hour times four hours times 1,000 users). One thing can be said for this approach: the costs add up astonishingly fast.

Despite the overwhelming volatility of these figures, they represent only one portion of the true cost of an outage. Somewhat more nebulous, but no less real, are the costs of blocked information flow, potential loss of sales, loss of customer goodwill and loss of other revenue producing opportunities such as investment activity and monetary transfers.

Depending on the line, application and user, the manager can formulate an overhead cost, which should represent these additional monetary penalties on top of lost wages.

Suppose in the examples already

In addition to specifying an acceptable level of performance, users should spell out in a contract the consequences, such as withholding of payment, of a product's performance not being up to par. If possible, the contract should also contain some clause about the vendor's and user's responsibilities in rectifying a situation where a product or service doesn't work as anticipated.

Although vendors are responsible for a certain level of testing of their own products and services, users must be prepared to do their own testing. "Testing tends to be poorly done," Watts said. His colleague Frank stressed, "Ultimately, it's the user who has to test and be responsible — independently of the vendor."

The bottom line in getting the right equipment is to understand and be able to describe what the company is trying to accomplish with the technology, according to Watts. Frank said, "a lot of businesses don't give the management attention that it needs to this area. You're in the greatest peril if you start making acquisitions without making a fairly rigorous effort to

“Trying to get multivendor equipment to work together is one of the key problems facing local-area network users.”

define your requirements." Users often ask a vendor to come up with some sort of requirements definition, Bernacchi said, which is the wrong approach. ▣

cited that the average additional costs per user of the outages were another \$10 per hour. Now the potential two-hour outage on one line represents a \$1,000 loss; an outage on the entire network rises to become an \$80,000 loss.

Safety nets
By establishing these numbers and exercising some reasonable assumptions about potential outages, the network manager can justify in clear business terms the need for certain features, which, to an untrained eye, may at first appear to be unnecessary safety nets.
The manager has a responsibility to protect his area from such accusations by setting up these kinds of formulas. That will make the economic case for what is truly necessary to protect the organization from catastrophic production losses. ▣

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- A. Manufacture of Computer Equipment (Data Processing Hardware, Software and/or Peripherals)
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- C. Manufacture of Non-Computer Products, Goods
- D. Agriculture, Mining, Oil, Natural Resources
- E. Transportation Utilities, Services
- F. Communications Utilities, Services
- G. Public Utilities (Electric, Gas, Sanitation)
- H. Non-Computer Retailing/Wholesaling/Distribution
- I. Financial, Banking, Insurance, Real Estate Services
- J. Health Services
- K. Legal Firms, Services
- L. Education (Primary, Secondary, College, University)
- M. Government (Local, State, Federal, Military)
- N. Computer Consulting, Training
- O. Other Business Consulting
- P. Engineering, Architecture, Construction
- Q. Pure and Applied Research & Development
- R. Other Business Services
- Z. Other _____ (please specify)

2. What is your primary job function? (PLEASE CIRCLE ONE CODE ONLY)

- A. COMPANY MANAGEMENT (TITLES INCLUDE: President, VP, Treasurer/Controller, Owner, General Manager, Business Manager; DEPARTMENTS INCLUDE: Accounting, Finance, Personnel, General Administration and Management)
- B. COMPUTER SYSTEMS MANAGEMENT (TITLES INCLUDE: VP EDP, MIS Director, Data Processing Manager, Data Communications Manager, Network Planner; DEPARTMENTS INCLUDE: EDP/MIS, Data Communications)
- C. ENGINEERING/R&D/SCIENCE MANAGEMENT (TITLES INCLUDE: VP Engineering, VP R&D, Chief Engineer, Technical Director, Director R&D, Project Manager; DEPARTMENTS INCLUDE: Engineering, R&D)
- D. DIVISION/OPERATIONS/MANUFACTURING/PRODUCTION MANAGEMENT (TITLES INCLUDE: VP Operations/Manufacturing/Production, Division VP, Plant Manager, Purchasing Director, Production Manager, Operations Manager, Quality Control Manager; DEPARTMENTS INCLUDE: Manufacturing, Operations, Production, Purchasing, Quality Control)
- E. MARKETING MANAGEMENT (TITLES INCLUDE: VP Marketing, VP Sales, Marketing Director, Marketing Manager, Merchandise Manager, Product Manager, Sales Director, Sales Manager; DEPARTMENTS INCLUDE: Marketing, Marketing Research, Sales)
- F. ADMINISTRATIVE STAFF (TITLES INCLUDE: Administrator, Accountant, Business Analyst, Coordinator; DEPARTMENTS INCLUDE: Accounting, Finance, Personnel, General Administration and Management)
- G. COMPUTER SYSTEMS STAFF (TITLES INCLUDE: Programmer, Systems Analyst, Systems Specialist, Systems Technician, Data Communications Specialist, Technical Staff Member; DEPARTMENTS INCLUDE: EDP/MIS, Data Communications)
- H. ENGINEERING/R&D/SCIENCE STAFF (TITLES INCLUDE: Scientist, Systems Designer, Project Engineer, Applications Engineer, Technical Staff Member; DEPARTMENTS INCLUDE: Engineering, R&D)
- I. MARKETING STAFF (TITLES INCLUDE: Marketing Analyst, Sales Analyst, Sales Representative; DEPARTMENTS INCLUDE: Marketing, Marketing Research, Sales)
- J. EDUCATION/TRAINING (TITLES INCLUDE: Educational Administrators, Faculty, Instructors)
- K. CONSULTING (TITLES INCLUDE: Consultant, Advisor; DEPARTMENTS INCLUDE: Consulting, EDP/MIS, Communications)
- Z. OTHER _____ (please specify)

3a. Are any of your VAXes part of a VAXCLUSTER? ☐ Yes ☐ No

3b. Are any of your VAXes part of a DECnet network? ☐ Yes ☐ No

3c. If your VAX systems are active nodes on one or more networks, is the network: (CIRCLE ALL THAT APPLY)
A. local D. international
B. company-wide Z. NONE OF THE ABOVE
C. national

3d. Do you timeshare any DEC computers located elsewhere? ☐ Yes ☐ No

4a. Do you have any VAX computers installed at your location? ☐ Yes ☐ No

4b. Do you plan to buy any VAX computers for your location within the next twelve months? ☐ Yes ☐ No

4c. If you answered "yes" to questions 4a or 4b, what types of VAX computers do you currently own and what types of VAX computers do you plan to purchase within the next twelve months? (PLEASE RESPOND WITH SPECIFIC QUANTITIES)

MODEL	QTY. CURRENTLY OWNED	QTY. PLANNED FOR PURCHASE IN NEXT 12 MOS.
A. VAX 8800		
B. VAX 8650		
C. VAX 8600		
D. VAX 8500		
E. VAX 8300		
F. VAX 8200		
G. VAX 11-785		
H. VAX 11-782		
I. VAX 11-780		
J. VAX 11-750		
K. VAX 11-725/730		
L. MICROVAX II		
M. MICROVAX I		
N. PDP-11 (Any Model)		
O. MICRO PDP-11 (Any Model)		
P. PRO		
Q. VAX mate		
R. Rainbow		
S. DEC mate		
T. DECsystem 10/20		
U. IBM MAINFRAME		
V. IBM MINI		
W. IBM PC or Compatible (Any Model)		
Z. OTHER BRANDS (Specify Models Only):		

5. Does your company ever buy (or sell) used DEC or DEC-compatible equipment? ☐ Yes ☐ No

6. What type of operating systems are currently in use at your location? (PLEASE CIRCLE AS MANY CODES AS APPLY).
A. VAX/VMS H. P/OS
B. ULTRIX-32 I. MS-DOS
C. OTHER UNIX J. TOPS 10/20
D. VAXeln Y. OTHER _____
E. RSTS/E (CTSS00) _____ (please specify)
F. RSX-11M ()
G. RT-11 (CTS300) Z. none of the above

7. What is the annual sales volume or annual operating budget for your ENTIRE organization? (PLEASE CIRCLE ONE CODE ONLY)
A. Less than \$500,000
B. \$500,001 to \$1,000,000
C. \$1,000,001 to \$10,000,000
D. \$10,000,001 to \$25,000,000
E. \$25,000,001 to \$100,000,000
F. \$100,000,001 and Over

8. During the next 12 months, how much do you anticipate your organization will spend on hardware, software, peripherals, and services for your location? (PLEASE CIRCLE ONE CODE ONLY)
A. \$0 to \$9,999
B. \$10,000 to \$49,999
C. \$50,000 to \$99,999
D. \$100,000 to \$499,999
E. \$500,000 to \$999,999
F. \$1,000,000 and Over

9. How will the computer hardware, software and peripherals purchased for this location be used? (PLEASE CIRCLE ALL THAT APPLY)
A. For Internal Use Z. NONE OF THE ABOVE
B. For Resale

10. In which of the following ways are you personally involved with the purchase of VAX and VAX-related hardware, software, peripherals and services? (PLEASE CIRCLE ALL THAT APPLY)
A. User
B. Recommend Brands and Models
C. Establish Specifications
D. Approve Purchase
E. Acquire Them
F. Sell Them
G. Other Involvement _____ (please specify)
Z. NONE OF THE ABOVE

11. For what applications are the VAX systems at your location used? (PLEASE CIRCLE ALL THAT APPLY)

- A. Programming/Systems Development
- B. Database Management
- C. Word Processing
- D. Scientific and Engineering Applications
- E. Communications/Network Control
- F. Accounting
- G. Office Automation
- H. CAD/CAM Graphics
- I. Business Graphics
- J. CAD/CAE
- K. CIM
- L. Statistical Analysis
- M. Project Management
- N. Order Entry/Inventory Control
- O. Financial Planning
- P. Education
- Q. Data Input, Analysis
- R. Process Control
- S. Materials Resource Planning (MRP)
- T. Personal Time Management
- U. Tax Calculation
- V. Electronic Mail
- W. Laboratory Control
- X. Real Time Simulation
- Y. File Management
- 1. Voice I/O
- 2. Image Processing
- Z. NONE OF THE ABOVE

12. In your job, do you help to purchase, recommend, specify or approve any of the VAX-related hardware, software, peripherals, or services listed below? ☐ Yes ☐ No

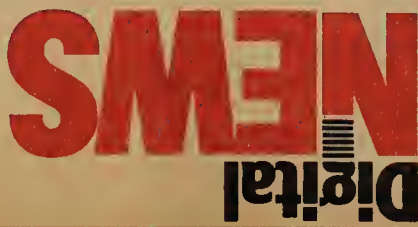
(IF YES, PLEASE CIRCLE ALL THOSE THAT APPLY)

- HARDWARE:
- 01. Supercomputers
 - 02. Mainframe Computers
 - 03. Minicomputers
 - 04. Microcomputers
- PERIPHERAL EQUIPMENT:
- 06. Letter-Quality Printers
 - 07. Laser/Non-Impact Printers
 - 08. Matrix Printers
 - 09. Line Printers
 - 10. Disk Drives
 - 11. CD-ROM/Optical Disk Subsystems
 - 12. Tape Drives/Subsystems
 - 13. Memory Boards
 - 14. Portable, Teleprinter Terminals
 - 15. Video Display Terminals
 - 16. Graphics Terminals/Work Stations
 - 17. Graphics Input Devices
 - 18. Plotters
 - 19. Disk Controllers
 - 20. Tape Controllers
 - 21. Communications Controllers
 - 22. Multiplexors/Concentrators
 - 23. Local Area Networks
 - 24. Wide Area Networks
 - 25. Modems
 - 26. A/D, D/A, I/O Hardware
 - 27. Array Processors
 - 28. Database Engines
 - 29. Security Hardware
 - 30. Power Supplies/Conditioners
 - 31. Chassis/Backplanes/Racks
 - 32. Cables

- SOFTWARE:
- 33. Communications
 - 34. Accounting
 - 35. Order Entry/Inventory
 - 36. Payroll
 - 37. Time Billing
 - 38. Financial Planners/Spreadsheets
 - 39. Project Managers
 - 40. Word Processors
 - 41. Language Compilers and Interpreters
 - 42. Database Managers
 - 43. Graphics CAD/CAM
 - 44. Engineering/Scientific
 - 45. Utilities/Development Aids
 - 46. Data Security
 - 47. MRP Software
 - 48. Business Graphics
 - 49. Videotex
 - 50. AI/Expert Systems
 - 51. Resource Accounting
 - 52. 4GL/Natural Language

- SERVICES:
- 53. Maintenance
 - 54. Education/Training
 - 55. Software/Systems Design Consulting
 - 56. Timesharing/Remote Computing
 - 57. On-Line Databases
 - 99. NONE OF THE ABOVE

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NEW PRODUCTS AND SERVICES

► COMMUNICATIONS SOFTWARE

ACC connects MVS to TCP/IP

IBM hosts gain crucial support for connection to Defense Data Network.

BY PAUL KORZENIOWSKI
Senior Editor

SANTA BARBARA, Calif. — Advanced Computer Communications (ACC) has unbundled software used to connect IBM hosts running the MVS operating system to networks supporting Transmission Control Protocol/Internet Protocol (TCP/IP).

In March, ACC announced its ACS 9310, a hardware and software package that attaches IBM mainframes to TCP/IP networks. Recently, the company unbundled the software, Access/MVS, and placed it on a second ACC communications processor, the IF-370/DDN.

TCP/IP support has become an important feature for companies that use the Defense Data Network. The Pentagon has decreed that only computer systems that support TCP/IP can be attached to the network, according to L. David Passmore, group manager at Net-

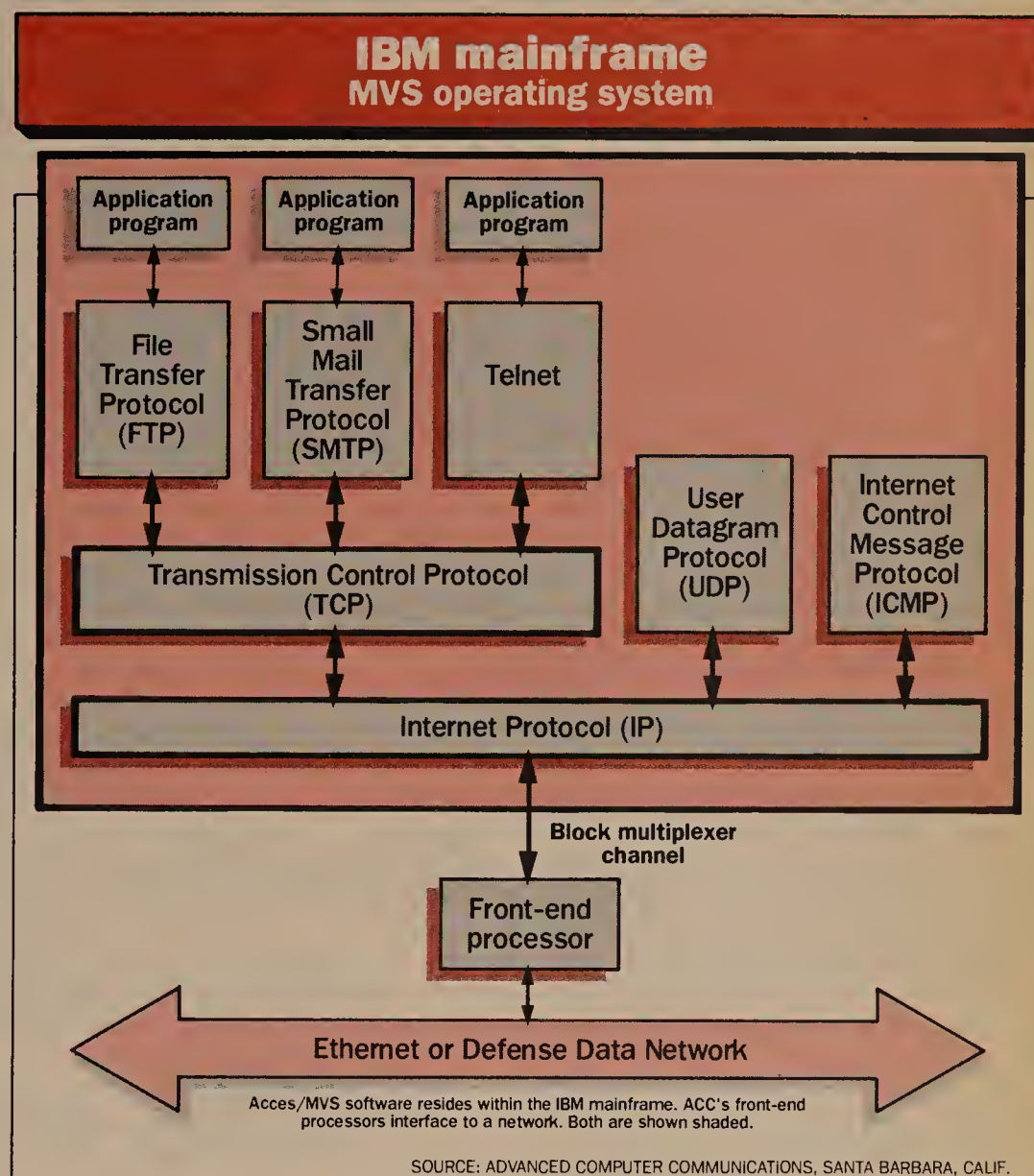
work Strategies, Inc., a consulting firm in Fairfax, Va.

IBM does not supply any connections for the protocols. Consequently, a handful of software companies are attempting to carve out a niche in this market with products that link IBM wares to TCP/IP networks.

Access/MVS runs on an IBM mainframe and consists of seven modules. The package includes File Transfer Protocol (FTP), Telnet, Small Mail Transfer Protocol (SMTP), Internet Control Message Protocol (ICMP), User Datagram Protocol (UDP), TCP and IP modules.

The FTP module controls file transfers between host computers, addition and deletion of files, retrieval of files and includes directory listings. Telnet enables users at remote locations to emulate locally attached terminals to a host. SMTP sends and receives electronic mail.

ICMP carries routing, congestion control and error report informa-



tion to host computers. UDP provides datagram services between two processes. TCP supplies flow control capabilities, uses checksums to verify data and retransmits data when necessary. IP supplies routing and addressing for

segments that may be moving between different host locations linked by network gateways.

Access/MVS sells for \$10,000. The ACS 9310 costs \$29,000, and the IF-370/DDN is priced at \$35,000. □

PRODUCTS & SERVICES

TI SNA Communications software
AUSTIN, Texas — Texas Instruments, Inc. recently announced software that ties its artificial intelligence-based Explorer system directly to IBM's Systems Network Architecture and Digital Equipment Corp.'s DECnet.

Both packages, **SNA Communications** and **Communications Interface to DECnet**, reside on TI's Explorer symbolic processing workstation. They support direct access to mainframe data bases and certain host programs.

The announcement places TI in the same arena as Cambridge, Mass.-based Symbolics, Inc., which, according to TI, also offers software connecting its symbolic processors directly to host systems.

The SNA package requires the use of an IBM 3708 Network Conversion Unit, which converts Explorer's Lisp language to SNA protocols and makes the Explorer appear to the host as a virtual terminal.

With the \$4,500 IBM 3708 converter, up to nine Explorer systems can be linked to a single SNA mainframe. The SNA package also requires the use of a host-resident file transfer package for downloading files from an IBM host to the Explorer.

The DECnet version talks directly to a Decnet local network and supports transparent file transfers between the DEC host and the Explorer system.

In addition to opening host data bases to the Explorer system, the links also support mainframe access to Explorer applications. The packages also support a degree of Explorer system access to host-resident applications.

"Integrating with conventional computing has to be one of the most important steps in order to really make artificial intelligence useful to a broad range of business applications," said Randy Beck, a product marketing engineer for TI.

Without a direct connection to

host data bases, he said, Explorer users were required to perform data base searches on the host, then download the needed data onto a disk or tape storage unit.

Beck said TI already supports the Transmission Control Protocol/Internet Protocol set on the Explorer, and has announced software that links the Explorer to Sun Microsystems, Inc. and Apollo Computer, Inc. workstations. The company plans to implement the Sun Microsystems Network File System protocol.

SNA Communications lists for \$3,000 per copy and \$15,000 for a site license. Communications Interface to DECnet lists for \$2,500 per copy and \$12,500 for a site license. The SNA Communications and Communications Interface to DECnet will be available at the beginning of next year.

Texas Instruments, Inc., Data Systems Group, P.O. Box 809063, H-878, Dallas, Texas 75380 (800) 527-3500.

IBM 3777-4 emulation package

Datanex, Inc. introduced software making Digital Equipment Corp. VAX superminicomputers and MicroVAX computers act as remote job entry workstations in IBM's Systems Network Architecture networks.

The **Ezcom-3770** package supports communications between the DEC VAX or MicroVAX and a host system by emulating IBM 3777-4 Remote Job Entry workstation functions. Residing on the DEC equipment, the Ezcom package makes use of the DMF32 synchronous port on VAX systems and the DPV-11 interface on the MicroVAX. Its user interface is compatible with Datanex's Hasp+ communications package for the VAX.

Available in the fall, the Ezcom-3770 package for the MicroVAX is priced at \$3,500. A VAX version of the package lists for \$7,500. □

Datanex, Inc., P.O. Box 1728, Eugene, Ore. 97440 (503) 687-2520.

Opinions

VIDEO TRANSMISSION

CHARLES N. JUDICE

Move over cable, here comes video via voice lines

Television has taken us from Uncle Miltie to MTV, from J. Fred Muggs to videocassette recorders and from Mr. Wizard to Mr. T. What's next?

From the vantage point of Bell Communications Research, Inc. (Bellcore), the next step for TV will be an alliance with the telephone networks. The introduction of fiber-optic cable into the public switched network is resulting in a massive increase in carrying capacity, one that could have a profound impact on TV. It could bring a quantum increase in the number of choices and the quality of images available to consumers.

Increased choices and improvements in picture quality are hardly new to the history of TV. Such innovations have been fairly constant.

The evolution of TV has consisted of two ages. The first spanned the decades from the first research prototypes, through the days of live broadcasts over a handful of VHF channels, to the proliferation of commercial networks and the establishment of color transmission. The second and present era is characterized by qualitative changes in variety and in picture quality brought by cable systems.

The difference this time will be one of magnitude. Fiber optics could present video consumers with a smorgasbord so rich and varied that something utterly new would be brought about. It could introduce a third age of video.

If plotted on a graph, the progress of TV through these two ages would appear exponential. It has taken less and less time for large changes to take place. For example, in the first age, about three decades elapsed between A.A. Campbell-Swinton's introduction in 1908 of the concept of forming images on cathode ray tubes and the debut of TV be-

fore a mass audience at the New York World's Fair in 1939. In contrast, only a year passed between that demonstration and the development of standards for commercial monochrome broadcasting by the National Television Standards Committee (NTSC).

World War II forced a hiatus in TV's progress, but at war's end, the second age of video took off at a gallop. By 1953, the NTSC had presented standards for compatible color transmission. By the mid-1960s, TV was a firmly established artifact of mass culture, and color transmission was virtually the new industry standard.

In the past few years, coaxial cable, VCRs, video laser discs and miniature, cordless TVs have entered the market, each immediately creating its own niche.

All of this represents a progression toward a greater efficiency in getting video technology out of the laboratory and into the marketplace. This progression has been due, in part, to developments in communications technology not directly related to TV, such as transistors, integrated circuits, magnetic recording and communications satellites. But the biggest factor has been the burgeoning demand for TV.

A good example of how TV's popularity can accelerate the deployment of new technology is the VCR. These amazing devices have disseminated themselves more rapidly through the market than anyone thought possible, and in the process they are permanently changing viewing habits. That could be just the beginning. Research at Bellcore suggests that VCRs, if interfaced with the telephone network, could be the harbinger of, and a bridge to, video's third age.

VCRs provide viewers with the first taste of video-on-demand, giving users a wide choice not only of what to watch, but when to watch it.

By building these machines with slightly more intelligence and connecting them with the hybrid telephone and cable TV networks,

the VCR's flexibility could be expanded.

The intelligent VCR could provide such amenities as up-to-the-minute program listings for local channels and a movies-to-go service. The key would be the telephone network interface, which would be the VCR's window on the world, much as a modem multiplies the information sources of a personal computer. Bellcore's experimental prototype of this system is called a video resource manager.

A typical exercise for the video resource manager is to record a program selected from stored listings. Programming listings, presumably transmitted through telephone lines, could therefore provide not only viewing information, but a menu for home recording. The process of programming a VCR for automatic taping would be reduced to the task of moving a cursor on the TV screen and pushing a button.

Similarly, telephone lines could be used to transmit catalogs from video vendors, from which customers could make selections to be automatically transmitted at a designated time for recording and later viewing. Billing could be handled by the telephone company.

New possibilities for video

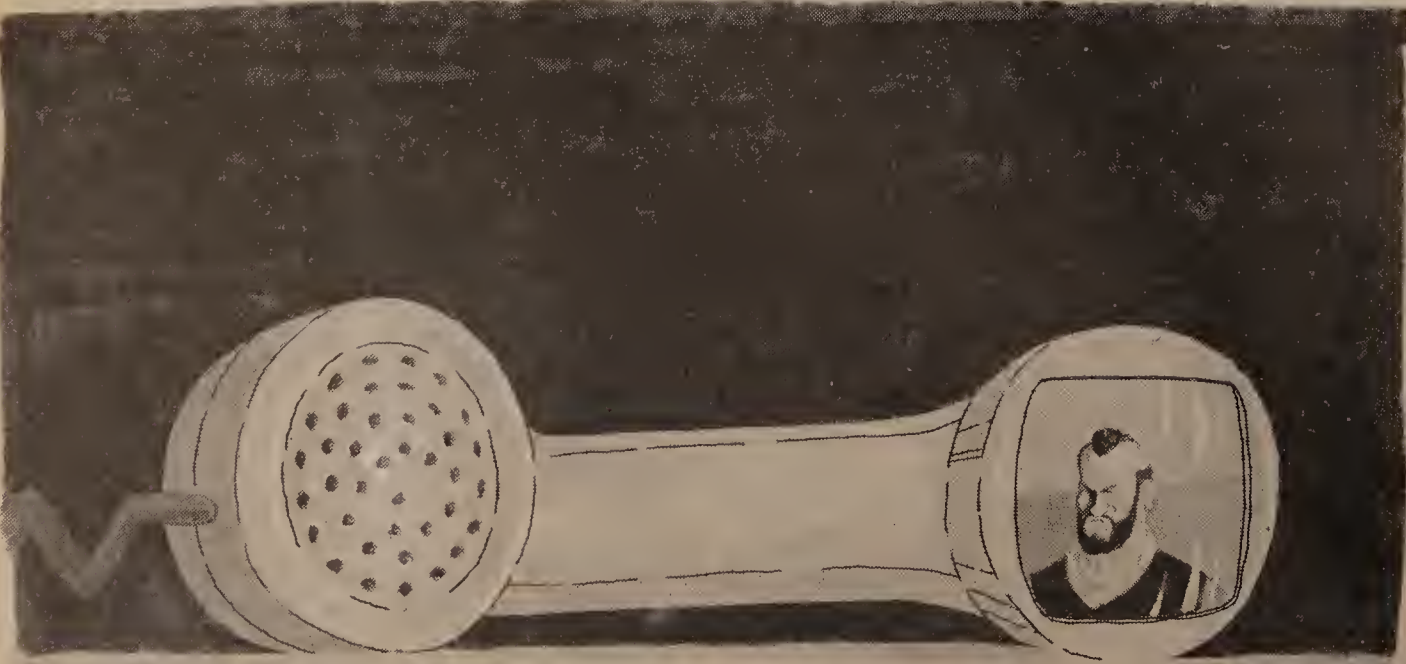
Obviously, such a service has implications beyond the entertainment industry. Anyone who has anything to sell on video tape, from home exercise to nuclear physics, could find use for this service. As fiber-optic lines are deployed in the local loop, network bandwidth will expand exponentially, which in all likelihood will mean a proportionate increase in video applications.

New possibilities include end-to-end digital processing, high definition TV, audio-ophile-quality stereo sound and, eventually, point-to-point, switched video transmitted in real time. It does not require a great stretch of the imagination to envision large screen TVs with theater-quality images becoming as commonplace as VCRs.

The availability of a huge channel capacity would encourage the establishment of very large video libraries and commercially operated data bases. Access would be limited only by the efficiency of the vendor's gate-keeping apparatus. This is true of video on demand.

The beginning of the third age of video is just a baby step away with the development of affordable programming control and VCR-network interface devices. In the third age, high-definition TV and video on demand will be taken for granted and communication by videotape through broadband telephone lines will be as commonplace as voice and data transmissions are today.

But the distinguishing feature of the third age will be the decline of the mass audience. Rather than a 20 million person audience watching one thing, 20 million one-person audiences will look at 20 million different things. When that happens, the third age of video will have arrived. **□**



Judice is division manager for speech and image processing research at Bell Communications Research, Inc. in Livingston, N.J.

PRO:

BY STEVE Y.R. KIM
Special to Network World

Personal computer communications takes place in two environments — from personal computer to personal computer or other computers, and from personal computer to value-added network.

Tymnet/McDonnell Douglas Network Systems, Inc.'s error-correcting protocol, X.PC, is based upon CCITT recommendation X.25, which defines a dedicated leased-line connection between data terminal equipment (DTE) and data communications equipment (DCE).

X.PC's primary purpose is to provide errorfree communications between DTE, such as a personal computer or terminal, and DCE, which is typically operated by a value-added network provider.

X.PC also provides the ability to communicate between two personal computers or to have multiple simultaneous sessions with several computers.

Designed to be flexible, X.PC may be implemented in modems and other hardware as well as personal computer communications software and many widely used public and private networks. A partial list of vendors that have announced support of X.PC includes Concord Data Systems, Inc., Hayes Microcomputer Products, Inc., Microsoft Corp., MCI Communications Corp. through its MCI Mail, Racal-Vadic, Inc., Tymnet and Western Union Corp. through its Easylink service.

Several Tymnet customers have incorporated X.PC into their internal communications programs, and many other vendor companies are developing products that support X.PC.

X.PC is not hardware-dependent. It is being used in modems with the Zilog Z-80 processors, in software running on IBM Personal Computers or compatibles, with Intel Corp. 8088/86 or 80286 microprocessors and in the Apple Computer, Inc. Macintosh with the Motorola, Inc. 68000.

In addition, X.PC is easy to implement in software through a random-access memory-resident software module in the public domain. X.PC has been incorporated into a variety of specialized software used by Fortune 1,000 companies such as Chrysler Corp., Manpower, Inc., The Bekins Co. and International Marketnet Service.

If X.PC is implemented in software, end users don't have to purchase any additional communications hardware.

Errorfree communications is provided over a dial-up line with X.PC. It follows CCITT recom-

Kim is X.PC product specialist for Tymnet/McDonnell Douglas Network Systems, Inc. in San Jose, Calif.

mendation V.41 to perform this, using a cyclic redundancy check. The CRC-16 is recognized as the best error-correc-

tion mechanism for dial-up lines available today.

X.PC also provides many channels over the same physical dial-up link.

By allowing access to as many as 15 different host sessions over one physical dial-up connection, X.PC can significantly increase end-user productivity. Also, in multiuser environments, a variety of users can share a single dial-up connection to access different hosts.

In addition, X.PC is the only

asynchronous protocol that provides features usually found only in higher priced synchronous protocols, such as X.25 and IBM's Systems Network Architecture. However, X.PC offers those features at the lower cost of asynchronous dial-up.

X.PC can communicate at speeds of up to 9.6K bit/sec. It has an effective data throughput rate of 94% for point-to-point and 85% for traffic over shared lines on packet-switched value-added networks.

Microcom, Inc.'s Microcom Networking Protocol has 16% protocol overhead, according to the Ansi X12C Task Group I.

The distinction between the point-to-point and shared network environments is important.

Other protocols claim a very high point-to-point throughput rate. However, this is not important in a value-added network environment. See **Pro** page 32

CON:

BY CHRIS KANDIANIS
Special to Network World

Microcom, Inc.'s Microcom Networking Protocol (MNP) is the error-correcting protocol of choice for any organization interested in maintaining data integrity over asynchronous links.

Not only is it the strongest contender for standardization, but it also has the flexibility and compatibility needed to ensure its usefulness in a growing and changing environment. MNP offers cost cutting through efficiency and security through a large and rapidly growing installed base.

MNP is one of the protocols being considered for adoption as the worldwide standard asynchro-

applies this algorithm to asynchronous communications, which are typically unprotected.

So the error-correcting power typically associated with synchronous communications is now available in the asynchronous world for both interactive and file-transfer applications.

The cyclic redundancy algorithm, which is used in X.25, IBM's Systems Network Architecture and X.PC, has been proven effective in detecting errors.

The negotiation mechanism

MNP's true competitive edge lies in its efficiency. Many other protocols use a 16-bit, cyclic redundancy check algorithm to ensure data integrity. None, however, increase throughput and reduce communications costs the way MNP does.

MNP's efficiency is achieved as a result of a negotiation mechanism that manages different features to provide for varying levels of performance.

The negotiation mechanism is the process during the start-up phase of link establishment when the two modems negotiate the connection. MNP can negotiate the use of compression and techniques even faster than compression to provide users with greater performance through higher throughput.

MNP currently defines six different levels of performance. With each new class level, there is an increase in throughput, without sacrificing compatibility. MNP actually increases the amount of data normally sent in a given amount of time through compression.

X.PC, on the other hand, only identifies errors for retransmission but does not use compression. Therefore, the amount of time needed to transmit the same volume of information is greater.

For example, sending a standard text file using a 2,400 bit/sec modem and X.PC, throughput will be approximately 2,200 bit/sec because of protocol overhead.

Under the same conditions, throughput will be 2,600 bit/sec with MNP Class 3, 29K bit/sec with Class 4 or 48K bit/sec with Class 5. MNP offers a performance advantage over X.PC of 18%, 32% and 118% with Classes 3, 4 and 5, respectively.

The techniques that make MNP efficient are present at every class level. For example, MNP allows many messages to be sent before receiving acknowledgments, thus reducing delays and boosting performance in file transfer applications.

It will also formulate and send a packet with only one byte of data to optimize performance in See **Con** page 32

Kandianis is MNP product manager for Microcom, Inc. in Norwood, Mass.

THE ISSUE

Should communications users choose X.PC over MNP as their error-correcting protocol?

Features

September 1, 1986



Back from the brink

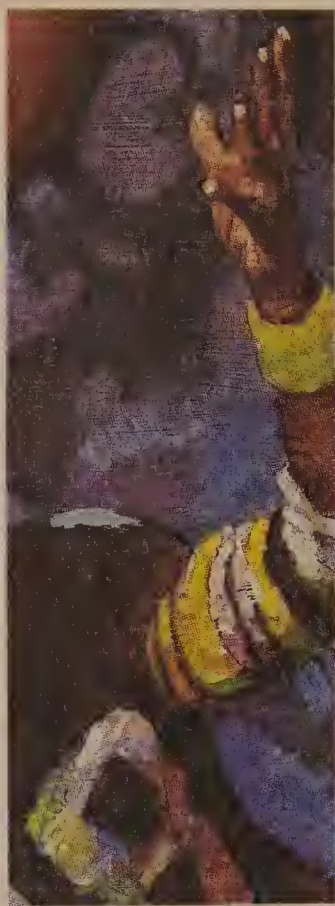
The advent of very small aperture terminals has brought satellite technology back into the bypass market. Corporate users agree that Vsats are saving them thousands of dollars, yet demand so far has been limited. Could explosive growth be just around the corner?

Page one.

Avoidance techniques

Corporations are signing declarations of independence when they make the break to bypass. Because there are now a few bypass and link alternatives, communications managers must carefully consider strategies before deciding on a corporate solution. Once the bypass is complete, however, the payoff can be tremendous.

Page 33.



Anatomy of a cutover: Part two

The University of Colorado has the recipe for a successful telecommunications system cutover. Blend together one consultant with experience managing large projects, a strong staff, a liberal amount of end-user training and aggressive vendor management — and top it off with a dollop of humor.

Page 35.

SPECIAL SECTION: BYPASS



Very small aperture terminals save the day for satellite system vendors.

FEATURE FOCUS

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Continued from page 1

when purchased in quantities greater than 200.

The rapid growth of this nascent industry has been accelerated by the constantly rising cost of both intrastate and interstate leased lines. Several users claim they will slash communications costs by casting off their leased lines in favor of Vsat networks. While over a dozen users are implementing interactive Vsat networks, Vsat vendors agree that demand for the satellite systems will not increase dramatically until a number of users begin to operate these same systems.

Vsat networks consist of a central hub, or master, an earth station, many remote Vsats and the satellite transponder space segment. The hub station is almost always larger than the remote Vsats and is frequently located near the user's main data processing center.

Outbound information is sent up to the communications satellite's transponder, which beams the information down for reception by the remote Vsats. Vsats at remote locations send information via the same satellite transponder to the hub station, which serves as the center of the star-configured communications networks.

Vsat strategies

When discussing their motives

from the brink

for purchasing or leasing Vsat networks, users are quick to mention the amount of money that using the satellite system will save their companies. Walter Bzdok, senior director of corporate telecommunications services for K mart Corp., projects that his company will save between \$4 million and \$5 million annually by replacing its existing communications network with a 2,000-site Vsat system provided by GTE Spacenet Corp. and GTE Telenet Communications Corp.

Frank Paulus, senior operations vice-president for the Des Moines, Iowa-based Financial Information Trust (FIT), says the 800-location Vsat net provided by Equatorial Communications Co. will save FIT \$140,000 per month. FIT currently leases a network comprising intrastate long-distance leased lines for roughly \$430,000 a month. Lee Backhorst, staff technical analyst for the St. Charles, Mo.-based Central Area Data Processing (CADP), claims his company will save between \$240,000 and \$320,000 per year by using a 120-location Vsat net provided by RCA American Communications, Inc. and Advanced Communications Engineering, Inc.

AT&T's belated entry into the Vsat service market will draw much attention, and probably more users, to the technology. The carrier attempted to offer its Skynet Star Network Service last April.

However, several Vsat service vendors filed complaints with the Federal Communications Commission claiming AT&T had priced the service to drive other Vsat vendors out of the market. The FCC rejected this and other arguments and allowed AT&T to start offering the service last May.

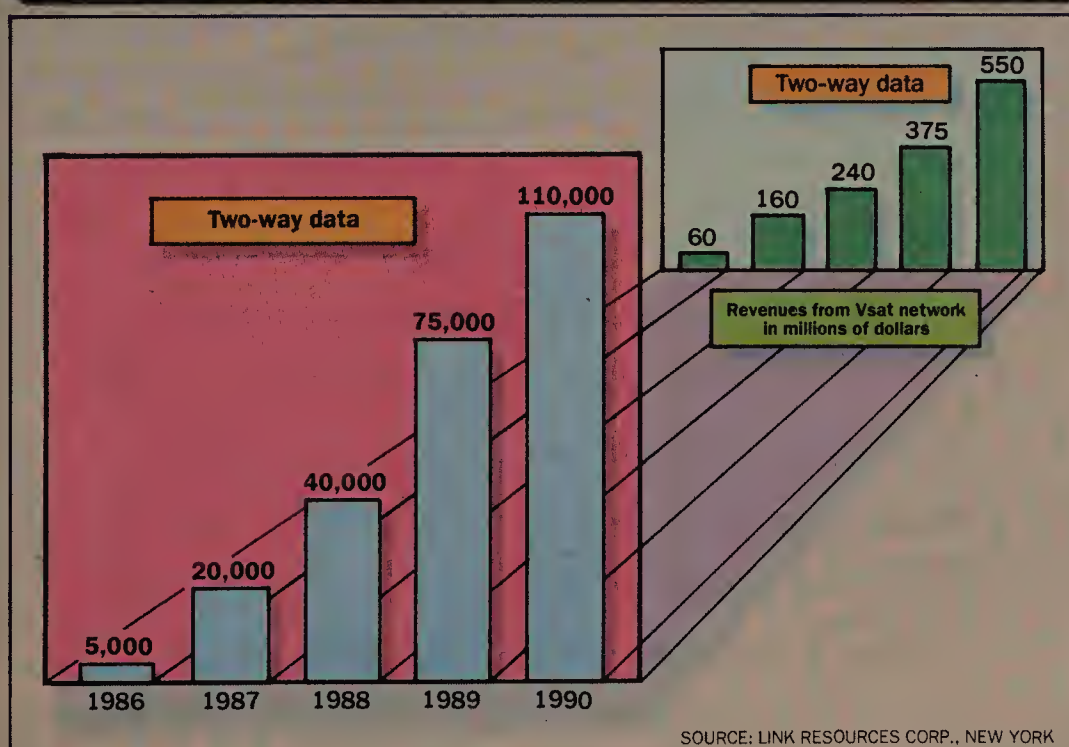
The likelihood of a Vsat market shakeout in the near future is small. While many vendors offer full-blown Vsat services, a number produce only Vsats themselves.

These hardware vendors package turnkey systems for users but do not have to bear the heavy financial burden of supporting satellites or individual transponders. On the other hand, many service vendors do not manufacture the actual Vsats and hubs and are thus spared the expense of supporting large manufacturing operations.

The majority of the vendors listed on the accompanying chart do not offer full Vsat systems; that is,

 Continued on page 30

Installed based of Vsats



Vendor	Service name	Service uses Ku-C-band ¹	Vendor that manufactures Vsats for service	Vendor that provides transponder space	Protected or preemptible	Can offer shared or private hub station	Maximum number physical ports on Vsat	Maximum device-to-Vsat speed	Voice and/or data supported	Data protocols supported	Inbound (to hub)
											outbound (to Vsat)
American Satellite Co. Rockville, Md.	Interactive Data Service	Ku	any Vsat vendor	American Satellite	protected	either	n/a	n/a	data, video, fax	SNA, SDLC, X.25, BSC, asynchronous	dependant upon equipment
AT&T Basking Ridge, N.J.	Skynet Star Network Service	Ku	Harris Corp.	RCA American Communications	intra-bird ² protected	either	24	56K bit/sec	data, video, fax	SNA, SDLC, HDLC, X.25, BSC, asynchronous	128K bit/sec
											1.544M bit/sec
Comsat Technology Products, Inc. Clarksburg, Md.	Starcom	Ku	Comsat Technology Products	any	depends on satellite transponder vendor	private	9	56K bit/sec	data, voice, video, fax	SNA, SDLC	56K bit/sec
											256K bit/sec
Equatorial Communications Co. Mountain View, Calif.	Equastar Transaction Network Service	C	Equatorial	Equatorial	protected	either	2	19.2K bit/sec	data	SDLC, BSC, X.25, asynchronous, Burroughs	120K bit/sec
											154K bit/sec
GTE Spacenet Corp. McLean, Va.	Skystar Interactive Network Data Service	Ku	any Vsat vendor	GTE Spacenet	protected	either	n/a	n/a	data, video, fax	SDLC, BSC, X.25, asynchronous	128K bit/sec
											512K bit/sec
Harris Corp. Melbourne, Fla.	none	Ku	Harris Corp.	any	depends on satellite transponder vendor	either	24	1.544M bit/sec	data, voice, video, fax	SNA, SDLC, BSC, X.25, asynchronous	125K bit/sec
											250K bit/sec
M/A-Com, Inc. Burlington, Mass.	none	Ku	M/A-Com	any	depends on satellite transponder vendor	either	15	56K bit/sec	data, voice, video, fax	SNA, SDLC, X.25, asynchronous	128K bit/sec
											512K bit/sec
MCI Communications Corp. Washington, D.C.	none	Ku	M/A-Com or other vendors	MCI Communications	protected	shared	15 on M/A-Com Vsat	56K bit/sec	data, voice, video, fax	SNA, SDLC	128K bit/sec
											512K bit/sec
NEC America, Inc. Melville, N.Y.	none	Ku	NEC America	any	depends on satellite transponder vendor	either	16	56K bit/sec	data, voice, video, fax	SNA, SDLC, BSC, X.25, asynchronous	56K bit/sec
											56K bit/sec ⁴
RCA American Communications, Inc. Princeton, N.J.	Micro Star	Ku or C	any Vsat vendor	RCA Americom	will supply either type transponder	private	n/a	n/a	data, voice, video, fax	will configure to customer needs	56K bit/sec
											512K bit/sec
Scientific-Atlanta, Inc. Atlanta	none	Ku	Scientific-Atlanta	any	depends on satellite transponder vendor	either	2	256K bit/sec	data, voice, video, fax	SNA, SDLC, BSC, X.25	256K bit/sec
											8M bit/sec
Skyswitch Satellite Communications Co. Golden, Colo.	none	Ku	Microdyne Corp. Ocala, Fla., or other Vsat vendor	GTE Spacenet or other vendor	depends on satellite transponder vendor	private	4	1.544M bit/sec	data, voice	user must handle protocol support	contact vendor for specific needs
Telcom General Corp. San Jose, Calif.	Ku-Net	Ku	Telcom General	n/a	depends on satellite transponder vendor	either	4	19.2K bit/sec	data, video, fax	SNA, SDLC, BSC, HDLC, X.25, asynchronous	9.6K bit/sec
											56K bit/sec
Tridom Corp. Marietta, Ga.	Clearlink ³	Ku	Tridom	GTE Spacenet	protected	either	15	56K bit/sec	data, video, fax	SDLC, BSC, asynchronous	32K bit/sec
											512K bit/sec
Tymnet/McDonnell Douglas Network Systems, Inc. San Jose, Calif.	Tymstar	Ku	Satellite Technology Management Torrance, Calif.	GTE Spacenet	protected	shared	12	19.2K bit/sec synchronous 9.6K bit/sec asynchronous	data, voice, video	SNA, SDLC, BSC, X.25, asynchronous Honeywell VIP	96K bit/sec
											512K bit/sec
Vitalink Communications Corp. Mountain View, Calif.	none	Ku or C	Vitalink	GTE Spacenet or other vendor	protected	either	4	1.544M bit/sec	data	SDLC, X.25, asynchronous	1.544M bit/sec
											1.544M bit/sec

This chart includes a selection of vendors that offer Vsat services or equipment. Many vendors that are not included offer Vsat services or manufacture Vsats.

Notes:
n/a - not applicable.
1 - Ku-band is 11 GHz to 14 GHz. C-band is 4 GHz to 6-GHz.
2 - see text.

From page 29 they don't manufacture Vsats and hubs and own satellite transponders. The bulk of the companies listed claim to offer turnkey Vsat systems, but these companies actually join forces with other vendors to offer users a complete system. For example, Tymnet/McDonnell Douglas Network Systems, Inc.'s Tymstar Vsat service uses Vsats that are manufactured by Satellite Technology Management, Inc. of Torrance, Calif., and a transponder space segment that is provided by GTE Spacenet Corp.

A few Vsat manufacturers have teamed up with Vsat service providers to offer a full-blown system offering. Such is the case with Harris Corp. and AT&T. Many vendors listed on the chart claim they will link with any Vsat manufacturer to package a hardware and services deal for a prospective Vsat net user. An American Satellite Co. spokesman argues that a Vsat service vendor should not link with a Vsat manufacturer until after the prospective user's network requirements have been determined.

“The future of the Vsat market is difficult to predict because of the large number of vendors offering Vsat services. Many users are awaiting results from pioneer companies whose large Vsat networks will not come on-line for several more months.”

Steve Salamoff, assistant vice-president with M/A-Com, Inc., says his company is not in the business of brokering to transponder space, but it would be willing to help the user choose the best satellite transponder space vendor for his particular application.

“We would specify the user's transponder requirements, contact all transponder space segment suppliers and ask them to bid on the network requirements,” he ex-

plains. “We would help the user analyze the bids, but the user makes the final decision on which company's transponder space segment his company will use.”

The future of the Vsat market is difficult to predict because of the large number of vendors offering Vsat services. Many users are awaiting results from pioneer companies whose large Vsat networks will not come on-line for at least several more months. Link Re-

sources Corp., a New York-based consulting and market research firm, forecasts rapid growth for the market. Link projects that revenues from sales of Vsat equipment and services for interactive data networks will rocket from \$60 million this year to \$550 million in 1990.

Vsat advice

Users who are considering either purchasing a Vsat network or leasing a Vsat service should first decide which application they plan to operate over the Vsat network. Users with transaction-oriented or point-of-sale-oriented applications may want to explore Equatorial Communications Co.'s Equastar Satellite Transaction Network service. Users who are planning to send high-volume data transmissions over a Vsat network may want to consider a vendor whose service handles high-speed data transfer applications.

Several Vsat services vendors and systems packagers offer more than just data transmission. Services offered by Comsat Technol-

Terms of agreement	Installation and maintenance	Network management
lease or purchase	both	✓
lease or purchase	both	✓
lease or purchase	both	✓
lease or purchase	both	✓
lease or purchase	both	✓
lease or purchase	both	✓
lease or purchase	both	✓
lease or purchase	Vsat vendor will handle installation, maintenance	✓
lease or purchase	both	operated by satellite service provider
lease or purchase	both	✓
lease or purchase	both	✓
lease or purchase	both	will train users and relinquish network management
lease or purchase	both	✓
lease or purchase	both	✓
lease or purchase	both	✓
lease or purchase	both	✓

3 - service will be available in November.
4 - can be expanded in 56K bit/sec increments.

ogy Products, RCA American Communications Co. (RCA Americom) and Tymnet support voice and data communications.

Several vendors' services also handle one-way video and high-speed facsimile.

Users should press both Vsat service providers and equipment manufacturers to determine what data protocols can be supported over a satellite network. Most vendors offer SNA, Synchronous Data

Link Control (SDLC), Binary Synchronous Communications (BSC), X.25 and asynchronous protocol support. These same vendors may also support two or three of a myriad of proprietary transaction processing protocols. A few vendors claim they will write software to support any protocol a user wishes to use with his Vsat net. Although Vitalink Communications Corp.'s Vsat service supports SDLC, High Level Data Link Control (HDLC), X.25 and asynchronous protocols, the service can also be used to construct satellite-based IEEE 802.3

preemptible transponder issue. All Vsat service vendors maintain the satellite transponders they own, or if the service vendor leases the transponder, it is protected by the lessor company. The exception is AT&T, which leases preemptible satellite transponders from RCA Americom for its Skynet Star Network Service. AT&T argues that the pair of transponders leased from RCA Americom are intrabird protected. This means AT&T's Vsat service users would supposedly be shifted to a spare transponder on the same satellite if several tran-

more remote locations must be performed to determine if a direct line of sight exists between the remote Vsats and the communications satellite. Users opting for private network hubs must also create a line of sight between this large earth station and the communications satellite. Some vendors, such as NEC America, Inc., will perform the site survey for the user. Firms that specialize in performing this function may need to be pressed into service in the event that the vendor cannot perform the survey or surveys.

Equatorial demonstrated its ability to offer a turnkey system, complete with even nontechnical services, when it signed a contract with Burlington Coat Factory Warehouse Corp. for a 75-site Vsat network. Mike Prince, DP manager for the company, says of this aspect of Vsat network installation: "The largest logistical problem we foresaw with quickly installing the individual Vsats was the difficulty we would have tracking down the various buildings' landlords to get consent to mount the Vsats on the roofs."

The Vsat installation agreement Burlington Coat has with Equatorial requires Equatorial to receive consent to mount Vsats on the roofs of the 75 sites. Equatorial is also handling all local zoning ordinance issues associated with Vsat installation, Prince claims.

The Federal Communications Commission streamlined rules for licensing Vsat systems in mid-April of this year. Prior to this FCC order, the Vsat network user had to license each Vsat with the FCC. Now a company planning to install a Vsat network must only submit single, blanket network filing to the FCC.

Prospective Vsat network users should examine Vsat system vendor's maintenance and network management capabilities. Almost all vendors listed on the chart claim to offer both maintenance and net-

Ethernet and IEEE 802.5 token-passing ring networks.

The next decision a user must make is whether or not he wants to run the network once it is operational. Operating a large Vsat network generally requires the purchase of a private hub station ("Vsat control," *Network World*, April 21). These large satellite earth stations range from \$500,000 to as much as \$2 million, depending upon the number of remote Vsats connected to the system.

In many cases, the prospective user also has the option of using one of the vendor's shared hub stations. In this scenario, User A's communications traffic is sent to the satellite from the same facility as User B's traffic. This situation makes life easier for the vendor that can perform network management for several nets at one site and for the user who does not have the resources or desire to become involved with the daily operation of the Vsat net. Joseph Rinde, product planning director with Equatorial, says of the shared hub option, "It saves the user the capital investment of building his own hub. It also saves the user the need to hire staff to manage the satellite network."

If the user opts for a Vsat network featuring a shared hub, it is the user's responsibility to link the company's corporate headquarters or its data processing center, which are often located in the same facility, with the vendor's shared earth station. This task is nothing to sneeze at. When Financial Information Trust inked a \$12 million pact with Equatorial for a 15-state Vsat net, the Iowa-based DP service bureau chose to share the vendor's Mountain View, Calif., hub station. Financial Information Trust claimed it will use 96K bit/sec leased lines to connect its DP center with Equatorial's hub station.

Prospective Vsat network users must also explore the protected vs.

sponders on the first satellite became inoperable.

Companies that lease space on protected transponders are less likely to face service outages in the event of a multiple transponder failure on a communications satellite than companies that lease space on preemptible satellite transponders. In the event of a multi-transponder failure or an unforeseen satellite catastrophe, service would be restored to those leasing protected transponders before it would be restored to those leasing preemptible transponders. Users should explore the ramifications of using either type of transponder as part of their Vsat network.

Users considering acquiring a Vsat network must also consider difficulties they may encounter in

“These same vendors may also support two or three of a myriad of proprietary transaction processing protocols. A few claim they will write software to support any protocol a user wishes to use.”

“Users considering acquiring a Vsat network must also consider difficulties they may encounter in installing the remote Vsats. Users should check with the municipalities in which they plan to locate remote Vsats.”

installing the remote Vsats. Users should check with the municipalities in which they plan to locate remote Vsats to determine whether bylaws might restrict or prohibit Vsat installations. Companies should also be wary when planning to attach Vsats to buildings not owned by the user company. Building owners may attempt to prohibit such action or may try to charge the company for the space the Vsat occupies on the building's roof.

Often a site survey for one or

work management services, but the scope of these services is unclear. GTE Spacenet, for example, will either perform these tasks or will train a user company's staff to handle the jobs.

There has been much talk of how the critical lack of satellite launch vehicles may affect Vsat service vendors over the next few years. The issue surfaced shortly after the Space Shuttle Challenger exploded in late January. The forced

Continued on page 32

“Most vendors offer SNA, SDLC, BSC, X.25 and asynchronous protocol support.”

From **page 31**
explosion of an Ariane rocket shortly thereafter rekindled talk of future satellite network problems.

Launch vehicle shortage

Troy Ellington, satellite programs vice-president for GTE Spacenet, says the shortage of satellite launch vehicles will affect the availability of satellite transponders in the next few years. The cost of insuring such space vehicles, coupled with the difficulty of getting a spot on such launch vehicles,

may cause Vsat network providers to hike service costs in one or two years.

"The [satellite launch vehicle shortage] will reduce the supply of transponders in the future," Ellington says. "Anytime you reduce transponder supply, the transponder price is driven up. If demand is static or is increasing and supply diminishes, there will be pressures to raise transponder prices."

All vendors agree that once a handful of large Vsat networks become operational, other users will

become more interested in the nascent technology and will purchase Vsat systems. Larry Huang, marketing and sales vice-president for Tridom Corp. of Atlanta, says there is no shortage of demand in the Vsat market, but there is a critical shortage of success stories. "There have to be a number of successful Vsat networks that users can point to and say they do everything they are supposed to do, they are reliable and they save companies money," he explains.

David Friedman, business net-

work and systems marketing director for RCA Americom, says two major roadblocks must be removed if Vsat technology is to proliferate. "The first roadblock is the immaturity of the Vsat market. There are very few companies that will take the initial risk with a product that has not fully matured," he says. "The completion of Vsat network beta tests and successful acceptance of Vsat networks by early users can remedy this situation. Users must also educate themselves on Vsat technology." □

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vironment because any packet-switched network will introduce delays and slightly reduce throughput. Therefore, even if the traffic is faster up to the periphery of the network, it will still slow down through the network.

Since September 1983, X.PC has been available to the public. Although the protocol was originally proposed by Tymnet, many of the other value-added nets, such as MCI Mail and Western Union, are implementing X.PC on their networks. Tymnet supports the IBM Personal Computer version of the X.PC software module and provides free consultation to any party interested in testing or implementing X.PC.

Future enhancements of X.PC are defined by the X.PC Vendor/User Forum, an organization with a membership that is represented by more than 30 modem and personal computer software companies, value-added net representatives and corporate users. Members take an active role in defining needs that would allow cross-vendor compatibility in the communications industry.

Some of the work groups in the organization are addressing issues involving file transfer, personal computer software-to-modem interface with X.PC and additional X.29/X.3 parameters.

X.PC promotes not only compatibility among vendors in the same market, but also compatibility among the modem, software and value-added network industries. X.PC has been considered as an asynchronous standard by standards organizations, although the

Con from page 27

interactive applications.

MNP's negotiation mechanism also provides users with a high degree of flexibility and compatibility. An MNP modem can communicate with any other MNP modem at the highest performance class level common to both. It can establish a link with any system that supports MNP in software rather than in the modem. In fact, some large corporations have implemented MNP into their communications software, allowing non-MNP modems to establish an errorfree link with their

standards committees are currently focusing on future synchronous communications.

The future — X.32

CCITT Recommendation X.32 defines a dial-up connection between DTE and DCE using X.25 link and packet levels. Like X.25, X.32's primary use is for DTE communications with value-added networks. X.32 has recently been approved as an interim standard by the Consultative Committee on International Telephony and Telegraphy.

Although there are areas in the standard that must still be completed, the acceptance of the recommendation means that synchronous access to value-added nets is a reality.

However, X.32 is not a competitor of X.PC or Microcom Networking Protocol. It is addressing a completely different market segment, primarily companies with users that are already communicating synchronously with a value-added network.

new MNP-based modems.

MNP modems are built so they can easily and automatically select operation compatible with both non-MNP and MNP modems. MNP modems will operate with non-MNP modems without the benefit of an errorfree link.

An important consideration for any user evaluating error-correcting protocols is the size of the installed base and growth potential. MNP has been used successfully for more than four years in a wide range of applications by companies such as Telenet, Inc., Uninet, Inc.,

IBM Information Network, General Electric Information Services Co. and CSC Infonet. It is also supported by more than 20 modem vendors.

Why choose MNP? If a user has a network that is growing and changing, MNP offers the flexibility to service that expansion. It offers data integrity with a substantial throughput reward. MNP remains compatible with and transparent to the application. It is available from a wide range of vendors and is a strong contender in the standards arena. □

“Future enhancements of X.PC are defined by the PC Vendor/User Forum, an organization represented by more than 30 modem and personal computer software companies, value-added net representatives and corporate users.”

This includes minicomputers that don't require a leased-line connection and asynchronous packet assembler/disassemblers, which concentrate the communications of many synchronous terminals into a single X.25 link.

Personal computers with X.25 cards are the dark horses for X.32. They will initially enjoy a smaller user population, especially given the \$1,000 to \$2,000 premium for synchronous communications. That's almost the price of an IBM Personal Computer-compatible machine. It is likely that most personal computer users will not move away from asynchronous communications until the premium is much lower than that, unless a particular user's application demands it.

The bottom line for end users will be three methods of communicating with a value-added network. Users that want a low price with low functionality will use straight asynchronous access.

Users that need an error-checking protocol such as X.PC will pay a slightly higher price. Users that require full X.32 functionality will pay the highest price for a system not as widely available.

Tymnet will offer all three ser-

vices on its value-added network. Tymnet is working closely with many companies that support X.PC. Modem and personal computer software that implements X.PC is readily available in the U.S. and abroad from third-party vendors.

Solution for custom applications

In addition to these off-the-shelf products, many corporations making use of value-added nets have found X.PC an ideal solution for their customized communications applications. They are using the Tymnet network, with its universal X.PC availability, to provide that solution.

Data networks, such as MCI Mail, Western Union, Tymnet and others, are currently offering the convenience of using these products to access host applications, both domestically and internationally.

X.PC is the logical solution for asynchronous data communications requirements. Because of its flexible implementation approach, its errorfree communications, its ability to provide multiple simultaneous sessions and its widespread support as a public domain offering, X.PC is the solution of tomorrow as well as today. □

“X.PC promotes not only compatibility among vendors in the same market, but also compatibility among the modem, software and value-added network industries. X.PC has been considered as an asynchronous standard by standards organizations, although standards committees are focusing on future synchronous communications.”

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SPECIAL SECTION: BYPASS

Avoidance techniques: the local road not taken

BY WALTER J. GORALSKI

Special to Network World

When Robert Uhl was promoted to director of corporate telecommunications for Wang Laboratories, Inc., he saw that there was a great need to improve throughput between the Finance Center computers in Chelmsford, Mass., and the Corporate Data Center computers in Burlington, Mass.

It was critical for these two groups to exchange information, and the sluggishness of this exchange was adversely affecting Wang's business.

The obvious course of action was to upgrade the data link between the two locations. However, Uhl found that several outstanding orders for 56K bit/sec circuits had been placed with New England Telephone two years before.

A call to New England Telephone showed that due dates were not assigned to the orders because of a complete lack of facilities in the Merrimack Valley region.


Today, Uhl runs one of the most comprehensive telephone bypass operations in the U.S. from Wang's Lowell, Mass., headquarters. The network satisfies such diverse demands as enhanced security, greater throughput, reliability, capacity and cost control.

Many times, the issue that has pushed particular companies toward bypass is the need for better data communications. Some companies, most notably railroads, have maintained their own communications networks exclusive of the public telephone because they possessed rights of way. The concept of rights of way dictates that whenever someone wants to construct a line to communicate with someone else, permission is needed to run the wire across the property of others.

However, voice communications is seldom as critical to a business as data transfer. As a result, bypass is considered a strong threat to local phone company revenues.

In 1984, the regional Bell operating companies discussed the growth of bypass technology with their employees. Telephone bypass was broken down into three categories that have since become blurred. The differences are important because it is crucial to consider different strategies before making a corporate decision on a particular type of bypass.

The first and most common type of bypass is service bypass. In this case, a company leases a common carrier private line to

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Goralski is a professor of computer science at Pace University in New York.



SPECIAL SECTION ILLUSTRATIONS BY JOHN KILROY

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gain access to a point-of-presence interface between long-distance and local phone companies for dial network services. This technology enables a company's private branch exchange to access US Sprint or another service when the caller dials a certain digit on his telephone.

Facility bypass is the second type. The goal in this category is also to access a point-of-presence interface, but now the link is provided by the company itself, or it is leased from a third party, rather than a common carrier. The function is still the same as service bypass, but facility bypass is more convenient for users.

Finally, there is total bypass, in which the company owns and operates its own private network. No common carrier or local phone company is involved in setup, maintenance or billing, although a contractor may be used for engineering or installation. This technology is the most expensive of the three.

This form of bypass offers the greatest opportunity for data communications managers. The elimination of an organization's dependence on local and long-distance telephone companies can result in a tremendous payoff. Payoff can be immediate if the lease arrangement is on a month-to-month basis. Long-term leasing arrangements take longer to pay off, especially if termination penalties are involved.

In his book, *Telephony*, Dimitris Chorafas notes that the cost of telecommunications for businesses in the U.S. is \$20 billion per year as of 1984. Some far-flung multinational businesses spend as much as 15% of their sales revenues on data and voice communications. In this environment, an anticipated savings of 25% to 50% over traditional phone company charges is both attractive and realistic.

"It used to be that a company worried about its voice communications first, and if there was capacity available to transfer data, fine," says Don Desjardins, sales engineer for Digital Communications Associates, Inc., a leading digital multiplexer company in Alpharetta, Ga.

"Now, companies set up their networks according to their data transfer requirements and then add the voice capacity on top of it. With the whole network going digital, it's just as effective," he continues. "That gives you the capability for running multiple 65K bit/sec channels for high-speed CPU-to-CPU transfer, or breaking it down with multiplexers for user workstations or PC networking."

This brings up another important point about bypass technology. The link itself can be one of several types, depending on the transmission medium.

Generally, the bypass link will be microwave, fiber-optic, cable television, broadband coaxial or copper twisted-pair wire. Satellite links are also available, but they pose a number of problems with design, implementation, installation and maintenance.

The reasons that a company chooses bypass determine which

link technologies it will use. "A company installs a bypass for four basic reasons," says Bob Ahrend, a telecommunications consultant and specialist for Kemcom Systems Corp. in Danbury, Conn. "First and foremost, [telecommunications managers] must provide users with the services they need. This is why data is such a big driver of bypass networks.

"Second is the increasing cost for data circuits, especially if the company is multinational. A 100-mile, voice-grade channel that goes for \$150 a month in the U.S. can cost over \$2,000 in France," he says.

"Another consideration is what I call 'bandwidth pressure.' Companies now realize that bandwidth is a resource, like disk space or CPU time. How it's partitioned in an organization is crucial for a business's overall well-being and [smooth] operation. If the bandwidth isn't there to give, it's like running out of disk space.

"Fourth, and last, is the growing technology involving high-speed data communications," Ahrend says. "If I need 10M bit/sec switched service between my corporate data centers in London, Chicago and Los Angeles, where am I going to get it?"

Once these needs have been addressed, telecommunications managers can begin to look at the different types of bypass links along the following lines: network topology, repairability, flexibility, security and cost.

Network topology refers to the logical and physical environment of the user community. For instance, local zoning may prohibit the installation of microwave facilities, especially in metropolitan areas.

Running coaxial cable requires a close look at rights of way. Empire City Subway Co., a wholly owned subsidiary of New York Telephone Co., was purchased for its rights of way for phone cables beneath the streets of Manhattan.

Repairability is a measure of not only the time it takes to fix a broken link, but also of the reliability and redundancy that must be built into the network from the start. Weather may affect microwave reliability as much as rising water tables may affect underground coaxial cabling.

Flexibility refers not only to how quickly the network can add a user or change a link, but also how quickly and easily the bypass network may be designed, installed and maintained.

Network management is complicated by the introduction of a bypass network. The combination of voice and data in one network poses another problem for telecommunications managers. But when it is done correctly, it is unbeatable.

The issue of security varies from being unimportant in some companies to vital in others. Microwaves, because of their scattered signals, are the least secure form of telecommunications. CATV coaxial can be easily tapped as well, making the use of scrambling devices a necessary expense for those who are

security conscious.

Of course, any bypass network is inherently more secure than the public phone network. Fiber-optic cable is the most secure of all, but may not be the optimum choice when flexibility and repairability are taken into account.

Cost is the bottom line in any company. The following is a simple cost breakdown for installing 1 MHz of bandwidth over 1 km, according to telecommunications author Chorafas:

■ Coaxial cable: \$450 per megahertz over 1 km.

*"For all its
promise,
bypass is only
a tool. It is as
good or as bad
as the ways in
which it is
used."*

■ Twisted-pair cable: \$300 per megahertz over 1 km.

■ Fiber-optic cable: \$10 per megahertz over 1 km.

Microwave cost varies widely because of local construction costs. It is worth remembering that even a total bypass network may be contracted for construction and maintenance. Seldom will a company have the necessary expertise in house for the construction and repair of a CATV bypass network. Most communities, however, will have a local CATV company that may consider doing the work.

In the case of Wang, two bypass networks have been installed in the Merrimack Valley to date — a microwave bypass to long-distance service and a total bypass cable network using broadband CATV.

For the first link, Wang established its own tariffed, common carrier subsidiary, Wang Communications, to install and run a 6-GHz microwave link.

Wang Communications carried the equivalent of 2,688 voice circuits between Wang corporate headquarters in Lowell and the Prudential Tower in Boston, where it interfaces a point-of-presence of another common carrier's long-distance network.

This allows Wang to lease T-1 1.5M bit/sec digital service links from Wang Communications, and it allows the subsidiary to generate additional revenue by marketing excess T-1 capacity to other private users as local bypass. *The Lowell Sun*, the largest regional daily newspaper in Northern Massachusetts, is one of their customers.

The bypass CATV network was installed by Colony Communications, a local CATV company with a coaxial right of way, which also maintains the network. Fifty miles of cable arranged in a star topology

link 11 sites over eight CATV trunks. Each trunk can effectively provide 78 T-1 links of 1,872 channels with 65K bit/sec each.

Its effectiveness was demonstrated when Hurricane Gloria struck on a Saturday in September 1985, and all three downed CATV trunks were back in service Monday morning. The only links still out were the backup circuits provided by New England Telephone.

Not all companies will need or want a setup as elaborate as Wang's. Several major New York banks use Manhattan Cable Television to transmit data from the Wall Street area to their offices in the midtown area. The links are point-to-point, polled and full-duplex to 50K bit/sec.

"Banker's Trust has been using those links since 1974," Arhend says. "When they cut over, the cable link was \$600. The phone company was charging \$800, and everybody knows about phone company communications in Manhattan. They had one failure in the first four months, and it was fixed in 75 minutes. A regular telephone line would be out three or four days."

Fiber optics is changing the picture. But for the time being, demand outstrips supply, and service demand by a company's user community is powerful because users generate revenue for the company.

For all its promise, bypass is only a tool. It is as good or as bad as the ways in which it is used. The integration of voice and data poses new problems for telecommunications managers. The tendency is to combine the management of the voice and data network once the physical merger takes place in a bypass network. Sometimes, though, it's a mistake.

Jim Plesich is the data communications manager for Pepsico, Inc. in Purchase, N.Y. For a while, he was in charge of both voice and data communications, and since data was deemed more vital to the organization than voice, the old voice organization was placed under him.

"It was a disaster," he says. "I had all of the responsibility and none of the control. The attitude in voice is totally different than in data. If a voice circuit is down, so what? Call them tomorrow, or write a letter. I couldn't make them follow the escalation procedures to get data circuits handled on a priority basis," he says. "Sometimes, I wouldn't find out about a circuit being down for three or four days. And I can't fix it if I don't know about it."

Pepsico went back to the old arrangement, and Plesich survived, but not without scars. "It was a lose-lose situation," he notes.

But not all experiences like that have to be negative, either for managers or users. Uhl's achievement is more typical of the bypass payoff potential. Wang expects the two bypass setups outlined above to save the corporation almost \$2 million annually in telecommunications costs. Whenever a company can couple savings with enhanced services and reliability, it makes for an unbeatable combination. □

► PROJECT MANAGEMENT

Anatomy of a cutover

BY STEVE MOORE
Features Editor

Second of a two-part series.

The morning after the University of Colorado's (CU) new \$10.6 million telecommunications system cut over on July 31, the CU telecommunications staff began compiling its "punch list."


Every time a discrepancy was noted between what was called for in the request for proposal (RFP) and what was actually done during the system installation, it was added to the list. Also included were any aspects of the system that did not meet CU's standards in terms of craftsmanship or industry practices.

CU's contract called for acceptance, or correction, of every item on the punch list within 45 days of the cutover. AT&T deployed an army of technicians on a 200-building campus to correct the problems

CU's director of office support systems. "We have very unusual terms with AT&T. We don't have any progress payments; we hold back 100%."

According to Jack Bindley, senior consultant at Telecommunications International, Inc. (TII) in Denver, vendors ideally prefer progress payments of 10% upon signing of the contract, 10% upon delivery of the equipment and 40% at cutover, with only 10% held back until acceptance.

AT&T responded to the CU RFP in August 1984, when it was using favorable payment terms as a marketing tool to win large contracts. "It worked very effectively," Lipton observes. "When I looked at

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As a result of rate increases as high as 100% per year, universities are building their own telephone systems and running them as profit centers.

that inevitably crop up when a 10,000-line telephone system and a 500-terminal data network first go into use.

"There is a very large incentive built into our contract for AT&T to get it over with," says Jeff Lipton,

(part 2)

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what those terms and conditions meant to us financially, it was a very attractive offer. The cost of AT&T's proposal was lowered by the amount of interest that we could accrue during the construction cycle. My estimate is that for every week acceptance is delayed, we earn an additional \$10,000 in interest income."

Today, it's highly unlikely that a private branch exchange buyer will enjoy such advantageous terms. Bindley recommends, however, that users insist on holding back more than 10% until acceptance.

"You're lucky to get acceptance in four months," Bindley says. But Lipton says he expects that CU's acceptance will come within about two months; while Pat Pomponio, AT&T's project manager for the CU project, is determined that it will occur within the prescribed 45 days.

Freezing the data base

The date on which the data base containing cable, equipment and user records for all the lines on a system is frozen, prior to cutover, has a profound impact on the success of a large telecommunications installation. It's to the vendor's advantage that the data base freeze be as long as possible, perhaps as much as six months, so that the system can be completed and tested before cutover without endless last-minute changes.

Moves, adds or changes requested before the freeze must be completed before cutover, otherwise they will end up on the punch list and make it more likely that acceptance will be delayed. Typically, such changes either do not cost the customer extra or are billed at the same prices quoted in the RFP. Changes requested after the freeze do not have to be completed before cutover and may be billed at higher rates.

"I would never agree to a six-month freeze," Lipton says. "This was roughly a six-week freeze. Perhaps it was more favorable to us than AT&T, but you've got to keep your business running in a productive manner."

Lipton runs his operation like a business because his department doesn't get a dime of appropriated money or tuition money and must depend on the income it derives by selling services to faculty, staff and students.

Before divestiture, educational institutions enjoyed special low tariffs, but since 1982, many schools have faced rate increases as high as 100% per year. As a result, universities are building their own telephone systems and running them as profit centers. Because of its economies of scale, CU's on-campus phone company is able to make a profit while keeping its rates below those of competing carriers.

"We're not going to be just a traditional phone company," Lipton says. "We're going to be a cable company. We will rent time and space on cable to various users on campus, depending on what their applications are."

New services will be offered on campus as they become available, starting with AT&T's Audix voice messaging feature. By October, Lipton expects to provide free voice-messaging services to about 900 members of the CU faculty, as part of a program to improve communications among faculty and administration in different departments.

"If I ever have any additional capacity on voice mail," Lipton says, "I think it's going to be a very marketable commodity in terms of reselling it to the students in the dormitories. I have a feeling that students will pay, between a couple of roommates, about \$10 a month for voice messaging."

A university that's in the telecommunications business has to know what it can and can't make money on and must plan accordingly. Lipton says it's more cost-effective to let the regional Bell operating company, Mountain Bell in this case, handle one-of-a-kind projects like installing temporary wiring for football games and rock concerts. To make it easier for a BOC to operate on campus, Lipton says, it should be allowed to keep its own wiring, conduit and other hardware on campus so that excessive reinstallation of cable for special events is minimized.

► AT&T's ISN

Data in the dorms

"Ever since AT&T brought this voice/data switch out, it hasn't been cost-effective to use it for data," says Dave Ballowe, systems analyst at the University of Colorado (CU). "I really don't anticipate that our System 85 will ever switch much data."

Instead of switching data through their new AT&T System 85 private branch exchange, CU decided to go with AT&T's Information Systems Network (ISN). Though marketed as a network, ISN is essentially a packet data switch.

According to Jeff Lipton, CU's director of office support systems, it was cheaper to buy ISN than to add data capability to the System 85. And, Ballowe adds, it was ISN's long-range potential rather than its current capabilities that made it CU's choice.

In addition to the fact that many new software capabilities (including security features such as access control and inactivity disconnect) are in the offing for ISN, Ballowe says AT&T has hinted that a 17M bit/sec bus may eventually replace the current 8.64M bit/sec ISN bus.

Initially, CU's ISN will serve 500 data devices, but Lipton expects that number to rise to as many as 1,000 by the end of 1986. The switch was originally ordered with 500 data ports to serve a projected 500 users. "What we failed to plan for was the number of ports that would be eaten up on

Good relations with the local operating company are essential to ensure a smooth cutover. "You can scheme all day about what you're going to do between vendor and client, but if you don't get that operating company involved early on, you're going to have problems," Bindley comments.

One big advantage for CU's system is that it will operate from a newly constructed building, with plenty of room for future growth. "We had to jump through a lot of hoops to demonstrate that there wasn't any existing space we could use on campus," Lipton says. "They wanted to put us in the old women's gym, under the swimming pool."

The new facility offers many pluses to the CU telecommunications staff, not the least of which is that many of its offices command a fine view of the Flatirons, a series of rock formations that mark the end of the plains and the beginning of the Rocky Mountain foothills.

Lipton's office reveals a couple of clues about his management style. One is a desktop sign that admonishes, "No whining." The second is a framed cartoon in which a manager sitting in a swivel chair says to a cohort, "All I need is a chair. I delegate everything."

the supply side," Lipton says. "You need one port per terminal, but you also need one port per connection into a computer. You can sign up all the users you want, but unless you are plugged into computers that provide the cycles to the terminal users, you don't have a network."

Previously, students who wanted to access large computers at CU's computing centers had to trek across campus and wait their turns at a limited number of personal computers and terminals. Now, students and faculty who have their own personal computers or terminals will be able to access mainframes and minicomputers via data jacks newly installed in all dorm rooms and campus offices. Because the network is all digital, no modems will be needed. ISN will cost students a \$35 installation fee plus \$7 to \$8 monthly.

"We've decided that ISN will not be the only data network on campus because it does have limitations," Lipton says. "We're getting heavily into research in artificial intelligence, parallel processing and graphics, among other things, and 9.6K baud just isn't going to cut it, particularly going from computer to computer. So we've got an Ethernet network and a couple of other networks. We see ISN providing the capabilities for the casual data user who pops up randomly around campus," he concludes.

— Steve Moore

While he's not quite that laid-back, Lipton has attracted a capable, largely independent staff, many members of which have long experience in the telecommunications industry.

Well aware that an organization can't be cut over in a flash like a new switch, Lipton gradually built up his staff over the project's four-year duration.

Even though he hired an expert staff and spent a lot of time on the road looking at other school systems, Lipton still retained a consulting firm. "You need a consultant, and not just to give you that extra level of credibility that you never have just through your own department. You only do a project like this once every 15 or 20 years, and you don't know everything. Consultants that do this day in and day out are worth their weight in gold — although we pay them in pennies," he jokes.

AT&T Branch Manager Dave Heinz doesn't dispute the value of consultants, but he prefers to deal directly with the customer. From the vendor's point of view, he says, "You've got to have a single point of contact in the customer environment."

Telephone training

Familiarizing university personnel with the new system was one of the biggest contributions made by Lipton's staff. "If training isn't done," Heinz says, "trouble reports will be high, due to ignorance that could have been avoided." CU managed to train more than 60% of its users before cutover.

"We put together our own training manuals for each different telephone set because we thought the AT&T documentation was inadequate," Lipton explains. "And we've put about 3,000 faculty and staff people through training classes, including sessions in Laotian and Spanish."

Even with the manuals and the training, the majority of the trouble calls handled by AT&T's control center operators were "soft" calls from users confused by the dual voice and data wall jacks or unsure which button to push on a new set.

In terms of "hard" problems that interrupted users' ability to conduct business by phone, by June 25 Lipton's staff had logged a trouble call percentage of only about 2.25% rather than the 4% to 6% Lipton had feared as a result of the AT&T strike.

"The consensus of all the comments I have heard from AT&T was that this was probably the best cut-over they have ever pulled off at a large university," Lipton says. And AT&T's Heinz isn't arguing. "This has probably been one of the most successful large cutovers, if not the most successful that AT&T has done since divestiture," he says.

Once a particular vendor's technology is selected at the end of the RFP process, the implementation of that technology is simply a construction project. And if the contractors are aggressively managed to ensure that the system is well-built, the best cutovers, like CU's, end up being anticlimactic. ▀

Calendar

Sept. 2-5, Chicago — Fourth Annual Oasi Conference. Contact: The Office Automation Society International, Suite B, 15269 Mimosa Trail, Dumfries, Va. 22026.

Sept. 2-6, Chicago — Integrated Office Information Systems: The Myths and the Realities. Contact: The Information Exchange, Oasi, 15269 Mimosa Trail, Dumfries, Va. 22026.

Sept. 3-5, Washington, D.C. — Introduction to Installing, Operating and Troubleshooting Data Communications Equipment. Contact: The George Washington University School of Engineering and Applied Science, Washington, D.C. 20052.

Sept. 3-5, Cambridge, Mass. — Hands-On Troubleshooting Data Communications Systems and Networks. Also, Sept. 24-26, Baltimore. Contact: The American Institute, Carnegie Building, 55 Main St., Madison, N.J. 07940.

Sept. 4, Kansas City, Mo. — Local-Area Networks: A Comprehensive Overview for Managers. Also, Sept. 9, Indianapolis; Sept. 10, Chicago. Contact: Ungermann-Bass, Inc., 2560 Mission College Blvd., Santa Clara, Calif. 95052.

Sept. 4-6, Long Island, N.Y. — Long Island Computer & Business Equipment Showcase. Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Sept. 7-10, Nashville — Planning for Network Integration. Contact: Southeastern Telecommunications Association, P.O. Box 901, Richmond, Va. 23207.

Sept. 8-9, Washington, D.C. — Managing Systems Projects. Contact: New York University School of Continuing Education, Seminar Center, 575 Madison Ave., New York, N.Y. 10022.

Sept. 8-10, Philadelphia — NCC-Telecommunications '86. Contact: American Federation of Information Processing Societies, 1899 Preston White Drive, Reston, Va. 22091.

Sept. 8-10, Chicago — Telecommunications Management. Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Sept. 8-10, Washington, D.C. — Packet Tech '86. Contact: Telestrategies, Inc., 1355 Beverly Road, McLean, Va. 22101.

Sept. 8-12, Tulsa, Okla. — CICS/VS Command Level Programming. Also, Sept 8-12, Chicago. Contact: Computer Assistance, Inc., Education Services, Suite 108, 11498 Luna Road, Dallas, Texas 75234.

Sept. 9, Arlington, Va. — Achieving Excellence: How to Implement the New Excellence-Oriented Management Style in Your Department or Company. Also, Sept. 10, Charlottesville, Va.; Sept. 11, Richmond, Va. Contact: Careertrack Seminars, 1800 38th St., Boulder, Colo. 80301.

Sept. 9-11, Atlanta — Intelligent Buildings Conference and Exposition. Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Sept. 9-11, Las Vegas, Nev. — Eighth Annual Satellite Communications Users Conference. Contact: Satellite Communications, 6530 S. Yosemite St., Englewood, Colo. 80111.

Sept. 9-12, Minneapolis — Data Communications: Components, Systems and Networks. Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Sept. 10-11, San Francisco — Introduction to Fiber-Optic Communications Systems. Also, Sept. 24-25, Chicago. Contact: Hinckley Communications, 14 Parker Road, Osterville, Mass. 02655.

Sept. 10-11, San Francisco — Timeplex T-1 Seminar. Contact: Timeplex, Inc., 400 Chestnut Ridge Road, Woodcliff, N.J. 07675.

Sept. 10-12, San Antonio, Texas — Data Communications. Also, Sept. 15-17, Boston. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Sept. 11, Washington, D.C. — Strategic Planning and Information Systems. Contact: New York University, School of Continuing Education, Seminar Center, 575 Madison Ave., New York, N.Y. 10022.

Sept. 11-12, New York — New York University Local-Area Network Seminar. Contact: Administrative Management, Dept. N, 1123 Broadway, New York, N.Y. 10010.

Sept. 11-12, New York — Understanding ISDN. Contact: Telecommunications Research Associates, P.O. Box 1200, Newark, Ill. 60541.

Sept. 11-12, San Francisco — Token-Ring Network Applications Program Interfaces Seminar. Contact: Communications Solutions, Inc., 992 S. Saratoga-Sunnyvale Road, San Jose, Calif. 95129

Sept. 11-13, Tampa, Fla. — Tampa Computer & Business Equipment Showcase. Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

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